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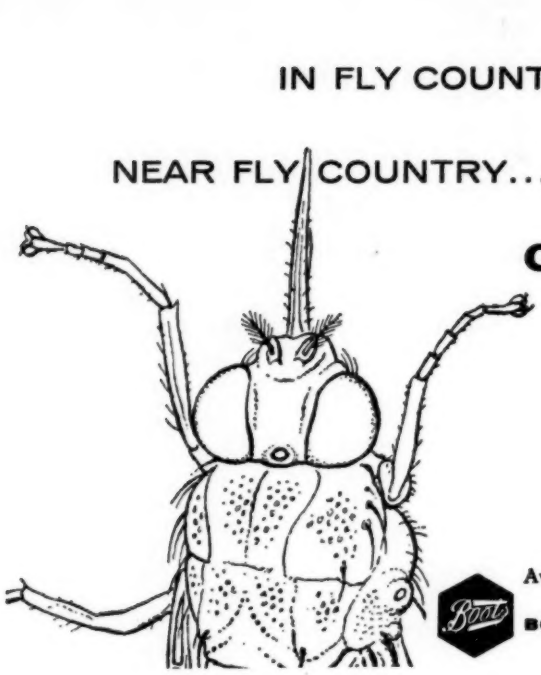

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Veterinary Education

THE subject of veterinary education has become a topic of international importance. In the spring of this year, representatives from countries all over the world attended a conference convened in London by FAO and WHO to take stock of the present facilities available for this scarce commodity and to make recommendations for improvement where necessary. Fifteen years ago the columns of THE VETERINARY RECORD rang with the controversy which arose as a result of the recommendations of the Loveday Committee Report, with its proposal for major changes in veterinary education in this country. The report was adopted and implemented and remarkable progress has been achieved in the veterinary Schools during the last 10 years, particularly in the facilities for teaching the clinical and para-clinical subjects. The cost has been great, because the provision of clinical material for veterinary teaching is an expensive matter, and there is nothing comparable to the National Health Service which subsidises medical education by providing clinical and other facilities in the teaching hospitals ; furthermore medical schools do not have the problem of providing cases for instruction from four or five different species. In the body of this week's "Record," there is a comprehensive survey of veterinary education which draws attention to one or two disturbing features. A strong plea is made for pruning the overcrowded curricula which apparently exist in most schools. It would be inconceivable that veterinary students should not have free access to the rapidly expanding body of biological knowledge, and it is suggested that this will take place unless either the curriculum is radically reorganised or the course is progressively lengthened. Conservatism is firmly entrenched in the teaching profession and there is a reluctance to depart from existing methods even by those people who, in their work, are firmly convinced of the advantages of experimental method. Changes are stirring in the medical curriculum, and the advantages of vertical integration with a consequent saving of time—but demanding a corresponding increase in the number of teachers—has many medical and veterinary protagonists in this country and in the United States.

The author of the paper stresses that the qualifying degree leading to registration in the Register of the Royal College cannot provide more than a preliminary qualification, whereas it has been traditional in the veterinary profession that the M.R.C.V.S. diploma qualifies the holder to undertake any work in the diverse fields in which the profession operates. It is suggested that circumstances have changed with the increasing diversity of interest in the profession with a concommitant need for increased specialisation. Undoubtedly, opportunities have multiplied for the employment of veterinarians and provision is being made for training people in many fields by post-graduate education.

New knowledge in medical science is likely to increase rapidly, but it would be unreasonable to expect veterinary courses to lengthen correspondingly and indeed there are valid reasons why attempts should be made to stabilise courses at the present length, particularly if it is accepted that post-graduate training is an essential preamble to specialisation.

In this country, the university courses leading to a veterinary degree occupy a minimum average of five years. One school reduces its course to four years provided students have good passes in their basic science subjects, in their General Certificate of Education (G.C.E.) in prescribed subjects. One school requires students to spend six years, the training in the clinical subjects being superimposed on a science degree. There is no simple solution to the problem of overcrowding, but it may well be that some easing could be obtained by demanding a level of knowledge in the basic science subjects before entry and thus allowing more time to spread the teaching over a five-year period.

There has been a great deal of interest in this country in entrance qualifications for university, and the Crowther report has much to say that could be applied to entrance into a veterinary school. In England, most medical schools accept Advanced Level passes and thus save one year's university instruction. The Treasury and the University Grants Committee may well wonder why this practice is not followed in most of the veterinary schools. Over the last 10 years, the U.G.C. has made a very large capital investment in veterinary education and is

(*Concluded at foot of col.* 1, *overleaf*)

Congress Paper read in Plenary Session

Veterinary Education*

BY

W. L. WEIPERS

University of Glasgow Veterinary Hospital, Bearsden, Glasgow

SUMMARY.—Any attempt to summarise a paper this length, might seem to be an impossible task, but in essence I have said very little that is new. My plea is that in veterinary education we should continue to stress the scientific approach and instil into our students the need for this attitude in all aspects of their work. Much has been done in the para-clinical subjects in the veterinary profession and there is a great need to apply scientific methods to the clinical subjects. Further advances in these subjects await the development of physiological and biochemical knowledge in normal animals and this can only be done by establishing viable departments in the pre-clinical subjects of physiology, biochemistry and pharmacology. It is obvious that facilities for research are necessary in all the disciplines in veterinary medicine.

Curricula should be such that students can gain the full benefit from attending a University and this can only be done by cutting down the content of the present courses by some measure of integration, the avoidance of duplication and the general acceptance by teachers that students cannot possibly learn all of their subject and that post-graduate study is essential for the training of specialists. While it is very important that veterinary students should spend some time in residence at the field station, it is equally important that they have opportunities of mixing with students of all faculties, probably in halls of residence and other university activities. Those responsible for veterinary education should also be familiar with developments in the livestock industries and related sciences and ensure that timely changes are made in curricula when these are desirable.

Introduction

VETERINARY education is a vast subject, and when I embarked on this paper I realised that the correct medium would have been a book, and that in spite of the accepted length of plenary sessions in other assemblies, I should occupy not more than one hour and that I should have to practice rigorous selection of my material. Veterinary education has much in common with medical education. The general pattern is similar and they share common problems. The most important of these has arisen from the rapid growth of knowledge in this century in the fields of biological and medical

* Plenary paper presented to the British Veterinary Association Annual Congress in Glasgow on Thursday, September 1st, 1960.

Veterinary Education.—*Concluded.*

faced with a fairly large annual recurrent expenditure which is incurred in maintaining the veterinary schools. There has been a tendency to assume that the major reorganisation is now complete, but in fact most of the improvement has taken place in the clinical and para-clinical science departments, and as is pointed out in the paper the greatest need in veterinary education at the moment is the provision of facilities and full departments for research and for instruction in the pre-clinical subjects, particularly physiology, biochemistry and pharmacology. In a number of the veterinary schools, instruction to veterinary students in the pre-clinical subjects has been given in existing departments within the medical schools, but fortunately changes are already taking place and some of these departments have already achieved a measure of autonomy which should lead in time to the establishment of full professorial departments within the school. If the present rate of progress continues into the next decade, the veterinary schools will play their full part within the universities in providing undergraduate and post-graduate education and in adding their contribution to new knowledge in the broad field of medical science.

FLOOD RESCUES

Members of the profession will read with pleasure of a gallant piece of work by a veterinary surgeon during the recent floods. The following is abridged from the *News Chronicle*.

Mr. Vincent Trought rescued three old ladies from their crumbling cottages when the River Creedy became a raging torrent on Friday.

"But for him, lives might have been lost," said Police-sergeant Bill Ford.

"The water was 12 feet deep at the bridge and 5 feet deep in the cottages when I got to the scene. Mr. Trought was already wading in.

"He got Mrs. Mary Salter out first and handed her over his head to me. We were up to our necks, but I got her to safety.

"Then he went back and brought out Miss Florence Smaldon, aged 82. The cottages were beginning to crumble by now. I got her away and went back to relieve him of Mrs. Lines, aged 60."

Dr. John Markby, who had waded in to the rescue from his own flooded home, said: "He did a very fine job and deserves our thanks."

The newspaper reports that Mr. Trought made very light of his efforts, but that local residents consider official recognition is due for his "heroism in the floods."

science with its sequel of unbelievable congestion of medical and veterinary curricula and the tendency to lengthen courses to accommodate the growth of new knowledge. It was no accident that when the veterinary schools in this country were embodied within the Universities, the operation was done in close collaboration with the medical faculties. It is important to realise, however, that the similarities of the course often obscure what are in fact very important differences.

Medical training is preoccupied, particularly in the latter part of the course, with the training of clinicians who will be charged with the importance of preserving human life at any cost. The medical student receives much of his instruction from specialists who deal with relatively narrow fields, and post-graduate medical education is also devoted to developing specialists who are well qualified to provide highly skilled treatment in a narrow field. Clinical work is no less important in relation to diagnosis to the veterinarian, but apart from small-animal practice and some luxury horse practice, the selection of a course of action or therapy will depend on economic factors and the problem of the individual sick animal will be viewed in relation to either the herd, the national herd, or the national policy. The important problems of overcrowded curricula and the attempt to accommodate new knowledge within the present pattern is occupying both medical and veterinary educationists and it may well be that the solutions in either field could have application in the other.

Modern Veterinary Education (First Period) 1762–1918 or later

There is ample evidence to suggest that systems of veterinary education were extant 4,000 years ago in India, China and Babylon, but modern veterinary education dates from the middle of the 18th century. The virtual extinction of formal veterinary education in medieval times was merely one facet of a general pattern which affected all biological sciences in particular and scientific study in general. In the early part of the 18th century, there was evidence of a renewal in the awareness of the importance of the need of scientific instruction in many of the older professions. The renaissance of ideas which was affecting the world of letters was awakening an interest in many aspects of scientific thought that had been dormant for centuries. Governments and others took a lively interest in animal disease and the veterinary interest finally crystallised with the establishment of a veterinary school at Lyons in 1762. Claude Bourgelat was appointed the first Principal and France became the centre of veterinary interest in Europe and the establishment of the veterinary colleges at Lyons and Alfort in 1762 and 1776, may be taken as the beginning of modern veterinary education with its content of instruction in scientific subjects. Facilities for formal veterinary education grew very rapidly and 30 colleges were established in 12 different countries in Europe within the next 60 years.

One of the main factors that brought the veterinary schools into being was the devastation caused by cattle plague in Europe in the 18th century. Losses of up to a 1,500,000 cattle were estimated to have occurred in Western Europe in the course of one epizootic. The evolution of a policy of slaughter and isolation was successful or at least was credited with controlling the spread of the epizootics. The veterinary colleges in most cases had been established by the action of government aware of the need to control diseases in the domestic animals and there is evidence that in the first schools, instruction was given mainly on farm animals.

It is on record, however, that about the time Bourgelat moved to Alfort, the emphasis on the instruction moved over to the horse. It should be realised that apart from railways and long distance sea voyages, most transport during the period of the Industrial Revolution was supplied by the horse, and there were pressing demands from military and civilian sources for the claims of the horse as a veterinary subject and for assistance with his ailments. Veterinary colleges were situated near centres of transport where patients were freely available for instruction.

Anatomy, particularly the anatomy of the horse, dominated the early part of the courses and clinical instruction, often quite extensive in the European schools, was also given in relation to the horse. By the end of the first decade of the 20th century, it was clear, however, that the day of the horse as a main source of transport was drawing to a close. In 1914, the British Expeditionary Force went over to France equipped in the main with horse transport, but by the end of the war the emphasis had moved over to mechanical transport and this pattern was firmly established in post-war civilian reconstruction.

Modern Veterinary Education. (Second Period) 1918, or later up to the Present

By 1918, there was a general realisation that radical alterations would have to be made in veterinary education to meet the changing needs. In some of those European countries where reconstruction was necessary as a result of the destruction that had taken place during the war, schools were completely reorganised and adapted or constructed so that the emphasis on the teaching could be moved over to farm animals and adequate provision made to accommodate the growing scientific subjects. The change-over period in the United States was also fairly rapid and was helped by the dramatic disappearance of the urban-placed private Colleges during the war period. The veterinary schools associated with the Land Grant Colleges developed rapidly and were ideally situated for instruction in farm animal medicine. Ambulatory clinics run in conjunction with hospitals were introduced to provide additional material for clinical teaching. In some measure this type of clinic was adopted in the continental schools and large hospitals were the rule.

The reorientation and reorganisation of the schools in Britain did not take place until much later. This was in some measure associated with the depressed condition of the agricultural industry and most schools were grossly lacking in facilities for teaching, particularly in the clinical subjects, and were also

inadequately staffed. In these circumstances, government bodies and others responsible for the conduct of research into animal diseases tended to favour a policy where such research was carried out in independent research institutes and control of research in animal diseases tended to pass out of the hands of the veterinary profession. As a result of this policy, these institutes grew in stature and outstripped the veterinary schools, becoming the obvious place where governments and other bodies arranged that research should be carried out ; thus a vicious circle was established. As a consequence, there has been a tendency to divorce veterinary education from research with a consequent loss to research workers, Universities and country generally. Veterinary research within the schools was relatively small in amount during the intra-war period and what could have become a torrent, became merely a trickle. Agricultural research tended to concentrate on non-veterinary problems. Governments were aware of this malaise and eventually set up an inter-departmental committee, the Loveday Committee, which studied the matter and recommended that radical alterations should take place in veterinary education. These were not implemented until after World War II and have only taken place in the course of the last 15 years. During this period all the veterinary teaching centres have become parts of their respective Universities, and all have facilities for instruction in farm animals and some provision for research.

The earlier policy has, however, left a legacy of whole-time research institutes quite divorced from the Universities and the main effort and expenditure in agricultural research, including veterinary research, is extra-university, a policy which is in marked contrast to that followed by the Medical Research Council in relation to Medical Science.

The Primary Veterinary Degree

I consider it to be most important to define clearly the object of the primary veterinary degree. I am sure the basic content of veterinary courses should have universal application, irrespective of the type of country providing the course of training and of the type of service which the veterinarian will give on qualifying. There is a fairly general acceptance, as was clear at the recent FAO meeting on veterinary education, that the minimum period for a veterinary course should be 4 years after the study of the basic sciences to university level. The veterinary student must have as a basis a broad knowledge of animal husbandry and be familiar with domestic animals in health. The study of pre-clinical and para-clinical sciences gives him a broad understanding of disease processes and patterns and a scientific basis for his knowledge of clinical medicine and allows him to recognise, diagnose and control diseases in animals. No matter what speciality a veterinary surgeon follows at a later stage, on completing his primary degree he should have sufficient clinical knowledge to allow him, as a result of a physical examination of an animal, and using such anciliary aids as may be desirable, to make an assessment of what is wrong and arrive at a diagnosis. The training leading up to this is unique and the veterinary graduate is the only person with a scientific training, with knowledge of animals in health and disease, and the ability to arrive at a diagnosis and apply such therapeutic or prophylactic methods as may be necessary. He is also the obvious choice to undertake responsibility for meat inspection because of his training in disease and pathology. His practice in meat inspection rests on a solid scientific basis.

Thus there should be an acceptance of the general nature of the undergraduate course and that specialisation can only be achieved by post-graduate training. It follows that any undue emphasis on any subject in the undergraduate course either unbalances or overcrowds the curriculum. Those responsible for a veterinary education, in addition to placing emphasis and giving direction and application to teaching along the lines that are currently desirable, should try to anticipate the need that will arise as a result of changes in the structure of the livestock industry. Courses should not be so rigid that they cannot be adapted to new ideas. It is natural that principals in private practice will want graduates who are interested primarily in clinical subjects and qualified to undertake the routine work of practice. If a college concentrates on this end, it may well sacrifice something more important in scientific training. Competence in practice will come later and be of a high level if fundamentals are stressed during the undergraduate training. It may well be that the current organisation is not the medium whereby we can make the greatest contribution to the welfare of the country. The present division of effort, whereby the larger part of the profession is interested primarily in private practice, but depends in some considerable measure on work from the Animal Health Division and assistance from their advisory services, is not necessarily the best type of organisation through which our full contribution in preventive medicine may be made. The position within the profession is never static and the rapid growth of the V.I. Service is bound to make a very considerable impact on the veterinary services and it is clear to many people that it has not yet achieved its final form or size.

Post-graduate Training and Specialisation

I am sure the time has come when every veterinary graduate should undergo some post-graduate training, even those destined for general practice. It is also my opinion that any school that turns out clinicians, ready immediately to go into practice and to undertake full responsibility, does so only by sacrificing some of the other and more scientific parts of the course to applied clinical training. The assistant post in any progressive practice is in effect a post-graduate training and the principal helps the recent graduate to apply the knowledge he has acquired in the University. The young graduate should also return for refresher courses to the veterinary schools quite early in his career. Such courses are now available in this country annually, and are usually over-subscribed, the demand exceeding the supply. In Russia, plans are in train, but not yet fully implemented, for all veterinarians to return every 5 years to a central training centre for a 3-month

period. The post-graduate training for other specialists is well recognised and, in addition to such courses, it is possible in some veterinary schools (including my own) for a student to combine a veterinary course with a science one, with a major study in anatomy, physiology, biochemistry or pathology etc., by extending his study period from 5 years to 7 years. In the past, the Royal College of Veterinary Surgeons has had fairly strong objections to a veterinarian describing himself as a specialist, but this is, I am sure, the survival of the practitioner domination of the Council and a relic of the time when the majority of veterinary graduates went into general practice. In fact the Royal College has been particularly active in the field of post-graduate education, the medium whereby specialists are produced. This country has also much to offer the developing countries in post-graduate training and the Royal College is solidly behind efforts to further opportunity in this field. The recent FAO report on veterinary education also stresses this need in all veterinary subjects.

In Universities, post-graduate training is recognised as an essential preamble to advancement in any discipline and years of specialisation qualify graduates for promotion to senior posts. In the veterinary field, it has been a common practice in the pre-clinical and clinical sciences. Recently Goodwin drew attention to the need for clinical specialists with a scientific training who would be available, in time, as teachers in clinical subjects and as consultants. With this view I agree. I think it is one of our great needs at the moment, but I would be less dogmatic than he is on how it should be done and I would be happy to see clinical specialists who had prepared themselves for their work by intensive post-graduate study in some aspect of the pre-clinical or para-clinical sciences, combined with clinical work or applied later thereto. I would be equally happy to see specialists developing either on a species basis or on a body system basis. The success of the later method depends on the selection of the system in the body for specialisation, because all of these do not lend themselves equally to this type of approach. I am sure there is a place for both types of specialisation. There is no doubt that system specialisation has a place within the schools, but it may well be that if clinical consultants develop within the profession as a result of the demands of the livestock industry, it will do so on a species basis. This approach is already established in other fields, for instance in small-animal practice and in the poultry industry and in the V.I. Service, it is tending to develop in other species. Should this trend continue, there is no doubt there will be a demand for post-graduate training in the veterinary schools to match this need. One difficulty may arise in the Universities if too much diversity develops in clinical specialisation in that the fairly rigid definition of the senior post may preclude the selection for promotion of those who have specialised in a very narrow field.

The Art and the Science of Veterinary Medicine

A veterinary degree in this country entitles the holder to practise the art and science of veterinary surgery. The Oxford English Dictionary on "science" says : "contra distinguished from art, the distinction as commonly apprehended is that a science is concerned with theoretical truth and an art with methods for effecting certain results. Sometimes, however, the term 'science' is extended to denote a department of practical work which depends on the knowledge of conscious application of principles ; 'art,' on the other hand, being understood to require merely knowledge of traditional rules and skills acquired by habit." Art means different things in different contexts. The "art" of the cave drawings of primitive man ; the "art" of Picasso and of artists in general ; what Rebecca West described as "the strange necessity" is vastly different from the farrier's "art." All these differ from the "art" of the Artful Dodger which has acquired a disreputable reputation. In our profession it has meant, and is still usually presumed to mean, skill in the practise of our profession and often related to the field of the surgeon. In practice, the word conveys the best of all these interpretations.

The highly skilled practitioner who was a master of firing, I am sure, had great difficulty in refraining from either signing his work, or at least initialling it, in the foot right hand corner over the suspensory ligaments. This practical doing of things in relation to wounds, fractures, accidents, etc., was an important component of veterinary work at one time and properly within the department of surgery, but it was of little help to know how to do things unless one knew what was wrong, and it must be stressed that diagnosis is just as important in surgery as in medicine and, in fact, is probably the part on which very great emphasis should be placed in any courses in relation to veterinary surgery. "Science," on the other hand, in so far as it affects veterinary studies, deals with precise knowledge and with structure and function, and phenomena associated with deviations from the normal. It was the aim of the intern to approach his problem in this way and to attempt to understand underlying changes which would be presented as clinical signs, capable of recognition, and on which he could make a diagnosis. There is, of course, no sharp division between medicine and surgery and any other division of clinical subjects ; all are branches of clinical science. A vast area between the "art" and the "science," and partaking in some measure of both, is occupied by traditional authoritative medicine based on observations and empirical findings. By clinical observation, it is possible to recognise certain disease entities and the course of these can be predicted from previous observations. A body of traditional knowledge has grown up and been transmitted from generation to generation that certain remedies may be effective in certain disease states. The deep-rooted desire in mankind to try to explain observed phenomena on a rational basis demands the evolution of a hypothesis. Thus theory on aetiology often follows the empirical evolution of a successful therapeutic.

In the past there has been little opportunity to submit such theories to experimental proof and

many have been proved to be quite untenable. The testing, for instance, of any therapeutic substance in the field is a very difficult matter because, in many diseases, spontaneous recovery takes place. Thus, in the past, the most important component in clinical work was observation. The use of this vast body of knowledge arrived at by empirical means tended to partake more of the " art " than the " science." In the past no other course was possible because little was known of biochemistry, virology, genetics, and not a great deal about physiology. The clinical subjects tended to be presented to students as things apart without relation to underlying changes and the authority for any statement was based on the experience of the lecturer. This was still within what I call the first period of modern veterinary education, of a piece with the original Alfort teaching, and I should say that to-day, in some of the schools throughout the world, this period is still current. The system produced a number of very good clinicians whose main qualification was a highly developed, almost uncanny, capacity for observation. These clinicians said there were more mistakes made by not looking than not knowing. How true to-day.

Modern veterinary education in the first and second period contained a blend of the art and science with a gradual but increasing emphasis on the latter. The emphasis has moved from the art to the science, not because our skills have become less—indeed, surgical skill has greatly increased and we can regularly practise techniques which would not have been contemplated 20 years ago—but because our knowledge has increased so greatly.

The development of clinical work in relation to science has had a much slower development, although it has always been realised that diagnosis is of paramount importance. Diagnosis has been defined as coming to a conclusion on insufficient evidence and one must constantly enjoin students not to seek to become better guessers, or develop intuitive senses, or the capacity for having impressions, but to study methods whereby additional information may become available and diagnosis more precise.

In human medicine, until about the middle of the 18th century, the examination of the pulse was the most profound scientific observation which entered into a physical examination. At that time, percussion and auscultation began to be used by clinicians in human medicine and *post-mortem* examinations were correlated with clinical findings. In this period, sometimes referred to as the period of therapeutic nihilism, the pinnacle of clinical success in some of the central European Medical Schools was to see that one's patients' *post-mortem* examinations corresponded with the clinical findings. Some clinicians became so absorbed and so intrigued with this interesting approach that it was thought to be *infra dig.* to use X-rays and attempt to short-cut the clinical examinations and, indeed, many of the best clinicians shunned completely the use of X-ray. This, to a certain extent, was a revolt against some of the people who introduced X-ray as a method which claimed to be a substitute for clinical examination. History has repeated itself in this matter many times. The important point is that no clinician can refuse to neglect any method of examination which will provide additional information and permit of more precise diagnosis.

In the veterinary field many practitioners, even to-day, arrive at a diagnosis using methods that have not advanced since the days of Hippocrates, and some veterinary students never receive instruction in percussion and auscultation. Veterinarians of a scientific turn of mind often revolted against this empirical approach to the clinical subjects and took refuge in the precise disciplines of their own science. Some of the people who were active in the V.I.O. Service at its inception, and who did excellent work in investigating diseases in herds and flocks, stated that to reach a diagnosis, the clinical examination was a waste of time and some of the animals in the group should be sacrificed to allow a precise pathological and bacteriological examination to be carried out. Such an approach is a denial of our heritage but I fear it has had a very distinct influence on the development of the V.I. Service which is, in effect, a consultation service but eschews information arrived at by clinical means or, rather, accepts without question the clinical findings of the practitioner. Occasions will arise when some animals must be sacrificed in a group in order to reach a diagnosis. Veterinarians in practice who do not regularly use biochemical, bacteriological and haemotological examinations in their cases will, in obscure cases, submit such material to diagnostic laboratories, expecting by this means to receive a diagnosis, failing to realise that a diagnosis can only be arrived at when such findings are studied in conjunction with the clinical findings. Others have the same exalted views of the ability to get an answer by means of radiology. An X-ray can only show different densities of tissues but, when taken in conjunction with clinical findings and a knowledge of radiology, it may yield a precise diagnosis. To diagnose abnormality using ancillary aids, it is absolutely essential that there should be complete familiarity with the normal so that deviations from normal may be detected. I am sure the day is near when no student will be allowed to pass into the profession until he has demonstrated at his final examination that he can examine animals clinically and is familiar with all the means whereby diagnosis is reached. This ability is of quite a different order from a knowledge of disease and a student may be able to recount every aspect of a disease but yet not be sufficiently trained to apply his information in the field of clinical science.

The growth of knowledge in science has been phenomenal in this century. All the opportunities now exist to combine the art and the science and there is a movement in this country to try to do this but it is not a simple problem. Some teachers would avoid completely the old empirical approach but, as all knowledge is not yet ours, this will inevitably be the method of choice in diseases and matters about which we do not have a satisfactory scientific explanation. Empirical methods can be used successfully and carefully observed phenomena can yield a cure before the underlying *modus operandi* is under-

stood. We also realise that we cannot explain in a scientific, rational way *all* observed phenomena in disease. To do so is to assume that no new knowledge or new concepts await discovery in veterinary science. Veterinary teachers in the clinical field will thus still give instruction in the art and science but it is imperative that they should be closely associated with research which will help, in time, to explain that which is still obscure.

Requirements for the Development of Satisfactory Teaching Centres

In the limited time at my disposal, it is impossible to give in detail all the reasons why the following requirements seem to me to be essential. I also wish to make it clear that I do not think there is only one way to achieve a satisfactory course in veterinary education and inevitably variations will take place in different countries depending on differences in social and cultural structures and on the organisation of the livestock industry and agriculture. It is my view, however, held very strongly, that allowing for all the variations in different parts of the world, there are basic requirements that are a *sine qua non* for the development of satisfactory courses in veterinary education.

(*i*) *Buildings*

The veterinary school should be as near to the other university departments as possible, but the need for clinical material for teaching may make it impossible to build the school on the main university campus. No modern veterinary school is complete without a field station containing a farm for the teaching of animal husbandry from the veterinary point of view and it is often necessary to site such a unit a little distance outside a town. Final arrangements and distribution of departments will depend on local conditions and some compromise may be necessary in the final choice. It is essential, however, that buildings should be in reasonably close contact with other university departments, and wherever possible, it is most important that all the departments, pre-clinical and clinical, should be in close proximity because in this matter as in many others, function tends to follow structure and difficulties of integration increase directly with distance between departments. Generally speaking, buildings need not be expensive and there are many advantages in related disciplines sharing accommodation for some part of their courses.

(*ii*) *Provision of Clinical Material for Teaching*

It is impossible to teach veterinary students without the provision of adequate clinical material. Three main methods are in use for this purpose. First, *Large-animal Practices Attached to the Colleges.* These general practices serve an area near the college and clinical material therefrom is usually supplemented by consultation work. In some districts, the veterinary school is the centre where the major part of all surgical work in the country is carried out and cases are referred for treatment. This type of arrangement allows the student to see a very large number of cases, but inevitably he is unable to devote a great deal of time to any one individual case. The main disadvantage of the system is that the teachers are so occupied in pursuing routine work and clearing the daily accumulation of cases, that they have little time for formal teaching and research. Students trained in these circumstances become very competent practitioners and leave college with a full knowledge of what they are likely to meet in practice.

The second method is by means of *ambulatory clinics.* These may be used as the main source of clinical instruction but they are more often combined with, and act as a feeder to, a hospital. This system allows students to visit the farms and has been devised primarily to make provision for the study of cases of a kind which are unlikely to be sent to hospital. The system was developed originally in the United States but has since been adopted in many other countries. It tends to suffer from the disadvantage that if the ambulatory clinics are large enough to allow small groups of students to see large numbers of cases, a considerable part of the instruction in what is one of the most important parts of the course, the clinical subjects, tends to fall to relatively junior members of the staff.

It probably has little advantage over the practice current in this country whereby students have a statutory period of " seeing practice " with practitioners ,particularly when this is carried out at the highest level. In some colleges in this country, what are, in effect, ambulatory clinics restricted to a limited number of farms, are used for clinical instruction and are ideal for detailed study of cases on the farm or in the hospital.

The third method is a system where the *admission of animals to hospital is the source of clinical material.* Large-animal cases are usually referred by practitioners, or may be brought back by members of the staff after consultation in the field. They may also be purchased for study. Animals that are being used in research investigation of a particular disease can also be of great value in providing clinical material and permit a detailed study of the pathogenesis and allow of a close clinical pathological correlation. In addition, an ample supply of small animals can provide convenient manageable and highly suitable teaching material, complementary to large-animal cases. With a relatively small number of cases of this kind, animals can be studied very thoroughly and can be used economically for several groups of students. Each case is studied in more detail than would be possible in cases visited in practice and, by the time the student has qualified, he will have seen a representative but limited number of cases in great detail, some followed through to *post-mortem* examination.

A combination of these methods provides an ample source of clinical material for instruction in our Glasgow School, and we feel this method has been of great benefit and has allowed of a large measure of integration. Physical proximity has also been important in achieving this end. We are now developing, as far as possible, the same type of thing in relation to biochemistry and we are accumulating data that are likely to be very useful in the future

and are even now proving of very great benefit. The correlation will probably be greater in future between pathology and biochemistry and we are trying to extend the same type of integrated system with the veterinary physiology department. Students who have a limited amount of clinical material, correctly selected, well studied, can in fact be given a sound training in clinical science. Such graduates may not appear to be so mature as those who have been fostered in the multiple clinic system and have seen and observed more superficially large numbers of cases but when the former have qualified for 2 years, they can be very clinically mature. The utilisation of a scientific approach to clinical studies provides a very sound basis for post-graduate studies in any other field. Such a system supplemented by a limited amount of routine work of the ambulatory clinic type can, indeed, be very efficient.

This system also has the great benefit that staff are not overburdened with routine work and have time to devote to teaching and research. It has the disadvantage that the clinical material does not automatically appear and depends on the continued association of the teaching staff with outside practitioners and the retention of their full confidence. Thus staff changes may, at least, temporarily disorganise this system. It also depends on the acceptance and probably the extension of the consultation system and the participation of the teaching staff in a dynamic programme in applied research in relation to their own subject.

(*iii*) *Teaching Staff*

There is a general acceptance of the necessity of post-graduate training for a lengthy period before a veterinarian is fully qualified to undertake teaching and meantime there is a global shortage of veterinary teachers. There is a great need for the establishment of post-graduate scholarships at a level which will not impose too great a hardship on the scholar, having regard to his earning capacity in practice, the conditions of service, salary, prpmotion, prospects, etc. In this, university service should be able to bear comparison with other veterinary careers. Such financial disparity as exists should be compensated for by opportunities for research, including the provision of reasonable grants to cover technical assistance and facilities for maintaining experimental animals and whatever is necessary for research. Other compensations exist in universities for opportunities to collaborate with experts in cognate disciplines. Teachers should not be asked to carry too heavy a teaching burden. When these conditions become established it should be possible to attract some of the most able veterinarians into the teaching field to fill key positions in the training of the next generation. The products of the schools cannot be better than those who teach in them.

Curriculum

Bourgelat's course in the middle of the 18th century occupied 4 years but in the following years in all countries it tended to be reduced to 2 or 3 years, only reaching 4 years again in the latter part of the 19th century. In the middle '30s it became 5 years and has now reached 6 in some schools. Bourgelat's course included basic science, pre- and para-clinical sciences, but was mainly occupied with clinical teaching and, surprisingly, the broad pattern has changed very little since. There has been some increase in the time devoted to the pre-clinical subjects, and animal husbandry and preventive medicine have been added. The main change has been the orientation of the subject in the main from the horse, to farm animals, cattle, sheep and pigs with only a small part of the time given over to small animals and horses.

The science content of the curriculum in the early days was related mainly to gross anatomy, a subject which attracted men whose minds were interested in facts and who may have been repelled by the authoritative approach to clinical subjects. This subject occupied a long part of the pre-clinical studies and it is not surprising that 5 of the colleges in Great Britain had principals who were professors of anatomy. When Pasteur's work began to make some impact on the veterinary profession, bacteriology, and later virology attracted veterinarians with scientific interests and for a long time this has dominated scientific thought within the profession. There was a tendency to assume that all disease processes could be explained in terms of pathogenic bacteria and the more important aspects of applied physiology, biochemistry and preventive medicine received scant attention. Recently husbandry and preventive medicine have begun to receive the recognition they deserve and indeed have been recognised as major disciplines in some schools ; in all schools the emphasis is being increased on these subjects even where instruction is given within existing departments.

One of the greatest needs in the British schools is to develop departments of veterinary physiology and biochemistry qualified to undertake basic research work and to establish information on normal patterns. The growth of knowledge in the biological sciences has presented veterinary teachers with serious problems. As new knowledge becomes available, teachers increase the total amount presented in their subject and a cyclic pattern is beginning to be recognised. First an overcrowded curriculum is corrected by the lengthening of the course and the curriculum again fills up and demands to increase the length are again made. There is no end to this process and if the content of the course has to match the increase and the growth of biological knowledge, then the training period will eventually occupy 6, 10, 15 or even 20 years. I am sure that this is not the answer. I am equally satisfied that the veterinary courses are grossly overcrowded and would benefit by lightening, but it appears to be the most difficult matter in the world for a teacher to reduce the content of his course. As universities are organised with almost autocratic powers vested in heads of autonomous departments, there is no easy solution. Meantime there is a tendency for duplication and overlapping to continue and I feel that the most reasonable solution is some well organised scheme of integration. Some

overseas countries have suggested incorporating in the undergraduate course a measure of specialisation and a bifurcation of the course towards the latter part with the object of production specialists. This, I am sure is patently wrong and either this course or any undue emphasis on any part of the course can only be done by extending the length of time of study or by scamping some other part of the curriculum. Meantime in this country veterinary curricula are grossly overloaded, each teacher assuming that he must impart to his students a comprehensive knowledge of his subject. In a 5-year course, it is not possible to give more than a general training in the basic and pre-clinical sciences. A broad understanding of disease patterns and processes and a knowledge of as much clinical medicine as will allow the recognition and diagnosis of disease and its control in animals.

Integration of Courses

Veterinary colleges and medical schools as organised did not lend themselves particularly to integrated teaching. Professors were absolute heads of autonomous departments, often situated in separate institutes, physically some distance apart. The only medium of integration was the academic body, faculty or its equivalent. In this country, the uniportal system with its examinations based on a year's work tended to foster the isolation of subjects, and clinical teaching was given in relative isolation from the other subjects and examined in the main by general practitioners. Educationists were familiar with this problem and the American schools tried to bridge the gap between the pre-clinical, para-clinical and clinical sciences, by establishing clinical conferences at which students of all classes and staff from pathology, physiology and biochemistry, as well as the clinical subjects, were present. This had some measure of success but did not go to the root of the matter. The desire to achieve integration for instance, say in the teaching of physiology, pathological and clinical subjects can in fact be defeated by one head of a department, in a university system which vests absolute authority for the conduct of the work of his department in his hands.

Any system of clinical instruction, which, in this rapidly expanding universe of biological knowledge, is not closely integrated with pathology, physiology and biochemistry is bound to fall far short of the possible and clinical instruction will again lapse into the dogmatic authoritarian approach, which should be a thing of the past. The North Western Reserve Medical School and a number of other schools in the United States have been experimenting with so-called vertical integration, a method of teaching whereby the systems of the body are studied contemporaneously from the point of view of anatomy, histology, physiology, biochemistry, pathology and clinical subjects. In this country many years ago, Leeds Medical School pioneered such an effort ; it may be significant that it has now reverted to the more orthodox and conventional type of instruction. The University Veterinary School of Philadelphia has announced that it intends to enter this field and is meantime working out a course in vertical integration. While at first sight the attractions of such a course are great, I am satisfied that at this stage, only limited aspects of clinical instruction lend themselves to such an approach. I am equally sure that only a radical change in the present system, a change that may be very difficult to reverse should it not be successful, can achieve vertical integration. It will also be necessary to have a very great increase in staff for any such plan.

Meantime, I would rather try to foster the type of evolutionary approach we have managed to achieve in a large measure in my own school with a very close clinical pathological linkage and, in a lesser but increasing degree, an integration with biochemistry, physiology, pharmacology and anatomy. The pathology/clinical integration has only been achieved in our school by the evolution of a hospital pathology unit which works closely with the clinical departments. Because of the slowness of our building programme, the pathology departments are still in the old college buildings, separated by about 5 miles from the hospital, but plans are in train to establish these at the hospital. When this takes place, further integration will be achieved with great advantage to the existing departments of pathology at present in the old college.

When courses in medicine and veterinary medicine were extended some years ago, there was an inevitable departure from the examination at the end of the academic year and one of the attractions of integration is a nostalgic desire to return to this type of examination with a repeat examination in September. The main justification for the radical type of integration which is being explored meantime is a widespread desire to avoid the dichotomy which occurred in the past between clinical medicine and the pre-clinical subjects, but I am satisfied that this need not happen and there should be a frank acceptance of the fact that one of the important motives in driving towards co-ordinated instruction is a realisation that many of the older clinicians were not familiar with the rapidly expanding body of knowledge in biological science. I am satisfied that the very close integration in Glasgow and some of the other university schools has made it possible to impart to clinical instruction a reasonably high scientific content and I would venture to hope that, if this develops satisfactorily, it might be the beginning of a third era in modern veterinary education.

The Need for Research in Teaching Methods in Veterinary Education

I am often surprised that medical and veterinary scientists have been so conservative in the type of course provided for training graduates. It seems to me highly unlikely that the early teachers who were responsible for the evolution of veterinary and medical education some hundreds of years ago were fortunate enough to devise a system which is incapable of radical improvement. Many of us are familiar with the difficulties of the present course, but few people have clear-cut ideas on how they could be improved. Veterinarians should realise

that in spite of the close similarities between requirements in medical and veterinary education, there are in fact very considerable differences in the applications and we cannot blindly follow anything that is evolved in the field of medicine. It should also be appreciated that changes in the organisation of agriculture may demand consequential changes in veterinary organisation and training. The Royal College of Veterinary Surgeons which has statutory responsibility for maintaining standards in veterinary education, has wisely refrained from prescribing detailed and precise requirements in university veterinary curricula and thus, some useful diversity can develop in the undergraduate and post-graduate fields. Indeed it is likely in Britain that each school will cater for different post-graduate needs. I think it will also be possible for individual schools to explore new methods of teaching and if these are manifestly successful, it would be possible for others to adopt whatever aspect would be suitable for their needs.

There is also a great need to pool knowledge in this field on the international level. At the recent F.A.O. Conference, it was recommended that an advisory panel on veterinary education should be set up. The panel would be available to give advice to any country seeking its assistance and would obviously be of particular value to the developing countries.

The Future of the Profession

I am satisfied that even in the atomic age, the veterinary profession has much to contribute to the future. One of the greatest needs of the rapidly developing countries of Africa and Asia is help with the health programme of the livestock in the large agricultural industries, and the need for veterinary education of the undergraduate and post-graduate level is colossal. In this matter we in this country can help.

My stress on clinical science is not because I consider that it is in any way more important than the other sciences in the curriculum but because, in the past, the scientific content has been so small in clinical teaching. Our main contribution in the future will be in the preventive medicine field, but unless this approach is made by veterinarians who are trained in the clinical sciences, our contribution will be very much less than it could be. It is my opinion that our greatest need in our veterinary centres in Britain at the moment is the establishment of well qualified and fully staffed departments of veterinary physiology and biochemistry. Until this happens, I cannot see that the concentration of effort in relation to our basic subjects will take place with the establishment of basic data on our special patients, ruminants and domestic animals. Information of this kind is an essential preamble to further advances in all the later veterinary subjects. There is a great need to increase research facilities within the schools so that teachers can take an active part in research, not as a thing apart, but as one aspect of his dynamic interests in the field of teaching. In veterinary medicine, it is possible to apply the experimental method in naturally occurring cases of disease, to investigate the nature of their occurrence, and to study their pathogenesis in a way which would be clearly impossible and unethical in human medicine. We veterinarians find ourselves to be in a direct line of succession from workers like Claude Bernard and William Harvey, and the results of our investigations will contribute to medical science and help both man and animals.

Acknowledgments.—I would like to acknowledge the opportunities I have been given in the field of veterinary education. It has been my privilege to be closely associated with both Scottish Schools as a student, as a member of staff and as a member of both Boards of Management. I have also been able to serve in the Royal College Council and have been particularly interested in its work in the field of veterinary education in the widest application. I have been able to visit many of the schools in Europe and in North America and I was a member of the F.A.O. delegation led by Sir Thomas Dalling, which visited a large number of Indian Veterinary Schools. I have served on the veterinary sub-committee of the University Grants Committee in this country and have had an opportunity of studying the developments in the schools during the expansion period in the last 15 years. It has been a unique opportunity and has given me a comprehensive conspectus of a large field of veterinary education. I wish to acknowledge my indebtedness to Glasgow University for the opportunities we have been given to develop a modern veterinary school within a university system. Particularly I wish to acknowledge the help I have received from the staff of the Veterinary School itself who are at one with me in an effort to try to raise standards. Favouring the change of emphasis to the scientific side, they have often pointed the way to me as to how ideas can be given practical application, and are themselves anything but bankrupt of ideas in this particular field.

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VETERINARY LABORATORY FOR DAR ES SALAAM

A grant of £38,000 from U.K. Colonial Development and Welfare Funds for the construction of a modern, well-equipped central veterinary laboratory in Dar es Salaam, to serve the rapidly developing needs of the livestock industry in Tanganyika, has been approved by the Secretary of State.

This laboratory will be complementary to, as well as forming an essential part of, the system of veterinary investigation centres recently established under the C.D. and W. Scheme and which are to be expanded to serve all important livestock areas of the territory.

Sarcoptic Mange in Pigs

BY

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SUMMARY.—The widespread occurrence of sarcoptic mange in pigs in Britain is demonstrated. The figures which for technical reasons must be regarded as minimal show that approximately one-fifth of our pigs and piggeries are infested.

Half the bacon pigs at an abattoir were found to harbour external parasites.

THOUGH mange due to *Sarcoptes scabiei var suis* is frequently recognised in pigs in this country, the incidence of the condition is unknown. The position abroad appears to be similar except in New Zealand where Brakenridge (1958) showed that out of 25 farms, 18 harboured the disease in spite of the fact that in that country the condition is notifiable. In New Zealand, severe cases of mange are often mistakenly considered to be "sunburn" by owners, while in Britain "dry meal feeding" is frequently the pig-keeper's explanation. The data presented below confirms the impression that the disease is quite prevalent in Britain.

Method

From 1951 onwards scrapings from the ears of all pigs purchased by a large breeding establishment near Edinburgh were examined microscopically after treatment with 10 per cent. NaOH. Each consignment was kept in individual isolation until the scrapings were taken. All the pigs were pedigree animals, and were unmated boars or gilts, or in-pig gilts.

During May and June, 1959, ear scrapings were taken in the same way from 74 Large White and Large White cross bacon pigs slaughtered at Edinburgh abattoir.

TABLE I
INCIDENCE IN PURCHASED PIGS

Year	Number Affected	Number Examined	Percentage Affected
1951	6	37	16.2
1952	1	8	12.5
1953	3	36	8.3
1954	5	24	20.8
1955	3	47	6.4
1956	19	51	37.3
1957	9	27	33.3
1958	10	45	22.2
1959	1	13	7.7
Total	57	288	19.8

Results

Table I shows the annual incidence of the disease and the incidence for the whole period. In approximately one-fifth of the 288 pigs purchased mange was detected. Each consignment of pigs was purchased from a different supplier. Table II shows that nearly one-quarter of the 140 suppliers sent infected consignments. During the whole period, although only 22 boars were purchased, 45 per cent. of them were affected. Infection was detected in 19 per cent. of the females.

TABLE II
PERCENTAGE OF HERDS AFFECTED, BASED ON EXAMINATION OF PIGS IN TABLE I

Year	Herds Supplying Affected Pigs	Total Herds	Percentage of Herds Supplying Affected Pigs
1951	2	20	10.0
1952	1	7	14.2
1953	2	32	6.25
1954	5	21	23.8
1955	3	16	18.75
1956	7	12	58.34
1957	4	7	57.14
1958	8	19	42.11
1959	1	6	16.66
Total	33	140	23.5

Infected consignments were received from each of the 42 Scottish and English counties from which the pigs originated, but the number of consignments from each area was too small to allow comparisons of incidence to be made between them.

In the bacon pig survey, 35 per cent. of 74 pigs yielded infected ear scrapings. Coincidentally it was recorded that *Haematopinus suis* was present in 5 per cent. and unidentified forage acari in 4 per cent. of the scrapings.

Discussion

The method of sampling was chosen because it was the most expedient. Griffith (1958) states that if ear lesions are present recovery of mites from this site is often easier than from many other sites on the body. It was realised that affected animals need not have ear lesions, and that there is no information available on the incidence of ear involvement in the disease. Exhaustive examination of the body surface was, however, impracticable. Whereas Brakenridge (1958) had whole herds available from which to pick infected pigs, the sample of animals from each herd in the present survey was very small. In these circumstances the figures recorded in Tables I and II must be considered as minimal for the incidence of mange in the pigs, though they probably represent the incidence of ear infestations fairly accurately. Even so, the numbers are disturbing, considering that they reflect conditions in the middle and upper sections of the pedigree pyramid in this country. Clearly a purchaser of pigs is likely to introduce mange to his herd unless he takes appropriate precautions.

Our experience over 7 years has shown that, in spite of frequent purchase of infected animals, it is possible by exercising great care to keep a herd free from mange. All pigs were isolated for a month after reception. On arrival, and 7 days later, all the pigs were treated for mange. A jet of warm soapy water was used to remove all the wax from the inside of the ears. Care is needed to ensure the efficiency of this operation. The ears were then filled with 25 per cent. benzyl benzoate emulsion, latterly by means of a syringe with a suitable nozzle. The whole body was then soaked with benzene hexachloride mange dressing (1/100 dilution of powder containing 0.625 per cent. B.H.C.) applied with a sprayer. While the pigs were being treated the bedding was burned, the house cleansed and sprayed with the mange dressing. A further spraying was given after the return of the pigs to the house, the animals being left in the gammexane-laden atmosphere for 1 hour with doors and windows shut. For 7 years this was successful. However, due to failure of the human element during the 8th year, the disease appeared in the progeny and contacts of animals which had been but a few months in the herd.

The economic effect of the disease on the pig industry is difficult to assess in the absence of experimental data. Field (1957), Kral and Novak (1953) and Brakenridge (1958) agree that the presence of the mites causes irritation and restlessness, and that young pigs can suffer severely and may die. Adult animals do from time to time become grossly encrusted and unthrifty. Though it is often stated that piglets affected with intercurrent disease are more likely to be severely affected with mange, the reverse is probably equally true. On a number of occasions it has been noticed that scouring, coughing, mange-infested piglets do not improve until treated for mange.

Though it is conventional to regard mange as a disease of the winter months, clinical sarcoptic mange occurs in pigs in the summer months. Apparently the warmth of the sun in New Zealand has no depressing effect on the mites in that country.

Pig-keepers regard scratching as a natural activity of the pig. The data here presented show that at least 50 per cent. of the bacon pigs examined were infected with mange mites, lice or forage acari, all of which cause restlessness and activity during periods when the pigs would normally be at rest. While lice were undoubtedly more prevalent than the 5 per cent. recorded, the forage acari may also have been more numerous. The effect of these mites on other species of host suggests that they will irritate the fine skinned parts of the pig.

The greatest effect of all these parasites is probably to widen the food conversion ratio of the host and so narrow an already slender profit margin. With relatively cheap and certainly efficacious modern remedies, lice and mange mites could be eradicated. A national or co-operative effort would, in the long run, be cheaper than the efforts of a few enlightened individuals.

The forage mite population of a pig farm would

(*Concluded in adjoining column*)

be relatively unaffected by efforts directed at the skin of the pig.

Acknowledgments.—To Professor G. F. Boddie I am indebted for permission to extract data from the records of his Department. The co-operation and help of Mr. G. R. H. Bishop is also much appreciated as is the help of Mr. J. Norval, City of Edinburgh Veterinary Officer, who arranged the slaughterhouse facilities. To the members of the technical staff of the Department of Veterinary Medicine who carried out the routine examinations over the past 9 years I also extend my thanks.

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Investigation into the Incidence and Causes of Infertility in Dairy Cattle. *Brucella abortus* and *Vibrio fetus* Infections

BY

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Part II. *Vibrio fetus* Infection

Introduction

IT has been demonstrated that *V. fetus* infection causes temporary infertility (Stegenga, 1950) and can be diagnosed by the vaginal mucus agglutination test, if due account is taken of the individuals' clinical histories (Boyd, 1955). At Dartington Hall and Somerset the main aim was to establish the incidence of vibriosis and determine to what extent it caused infertility in the 2 centres.

Material

Dartington Hall. 1,605 cows in 76 herds were sampled in winter and spring, 1955–6, followed by another round of sampling of 677 animals in 32 of the herds in summer, 1956. The herds were an unselected group except for size, only herds of more than 20 cows and heifers of breeding age being included. Both milk recorded and non-recorded herds in the main and sub-centres were examined.

Somerset. 2,682 animals from 102 herds were sampled at the same time as for *Br. abortus* infection.

Methods

All samples, taken by pipette (Pierce, 1947), were subjected to the vaginal mucus agglutination test at the Ministry of Agriculture, Fisheries and Food, Central Veterinary Laboratories, Weybridge (F.A.O., 1956). The results were read as negative, suspicious and positive. In many of the tables and in the text,

positive and suspicious reactions have been grouped together as positive reactions, since no difference was found between them when grouped separately.

Fertility assessment has been described under *Br. abortus*, but due to lack of reliable data in this early work the conception rate for the preliminary Dartington material was measured for the year during sampling instead of for the previous and current gestations.

Results

Incidence

The incidence of *V. fetus* reactions (Table XXIII) was fairly low in both centres. The number of positive individuals was 92 (5·7 per cent.) in Dartington and 72 (2·7 per cent.) in Somerset. These reactions were distributed over a large number of herds (Table XXIV). In both centres the majority of positive herds contained only one reactor, and only three herds had over six positive reactions each.

Repeatability

In Dartington, half of the herds were tested twice. The results of the 2 tests on a herd and individual basis were surprisingly similar. Eighteen herds, which were completely negative at the first test, were re-tested and 15 were again negative. Of 14 herds with positive reactions at the first test, 13 were positive on re-testing. Three hundred and sixty-four individuals were tested twice : 97·3 per cent. of the negative remained negative on re-test and 50·0 per cent. of the positive remained positive.

TABLE XXIII
INCIDENCE OF POSITIVE REACTORS TO THE VAGINAL MUCUS AGGLUTINATION TEST FOR *V. fetus*

Centre		First sampling					Second sampling				
		Negative	Suspicious	Positive	Total positive	Total	Negative	Suspicious	Positive	Total positive	Total
Dartington Hall	Cows	1,513	63	29	92	1,605	641	24	12	36	677
	Per cent.	94·3	3·9	1·8	5·7	100·0	94·7	3·5	1·8	5·3	100·0
Somerset	Cows	2,610	50	22	72	2,682	No samples taken				
	Per cent.	97·3	1·9	0·8	2·7	100·0					

TABLE XXIV
INCIDENCE OF POSITIVE REACTIONS TO THE VAGINAL MUCUS AGGLUTINATION TEST FOR *V. fetus* ON A HERD BASIS

Number positive reactions	Number of herds			
	Dartington Hall		Somerset	
	Number	Per cent.	Number	Per cent.
None	38	50	66	65
1	17	22	22	22
2	12	16	5	5
3	3	4	3	3
4	1	1	3	3
5	1	1	2	2
6	2	3	—	0
Over 6	2	3	1	1
Total herds with positive reactors	38	50	36	35
Total ...	76	100	102	100

Factors Related to the Vaginal Mucus Agglutination Test Result

Herd Size

Size of herd appeared to be associated with the incidence of positive reactions (Table XXV and Fig. 4). The larger the herd the more likely was the occurrence of a positive reaction. The higher incidence of positive reactions in large herds was independent of the use of natural service. This observation tends to indicate that the positive reactions were distributed in a random manner.

Age

In both centres positive reactions were associated with the older animals (Table XXVI). Those with more than 3 calves had a higher incidence than the younger cows, suggesting that the reactions were probably not of recent origin.

TABLE XXV
RELATION OF NUMBER OF SAMPLES TAKEN IN A HERD AND THE INCIDENCE OF POSITIVE HERDS FOR *V. fetus* (DARTINGTON HALL AND SOMERSET)

Herds	Number of samples				Total
	Under 16	16–20	21–30	Over 30	
Number...	30	49	57	42	178
Positive herds ...	7	18	27	22	74
Per cent. positive	23·3	36·7	47·4	52·4	41·6

Service History

As *V. fetus* is spread venereally (Lawson & MacKinnon, 1952) it is important to know the service histories of the herds and animals. Five of the 6 herds in Dartington with more than 3 positive reactors (Table XXIV) used a stock bull. Of the 78 positive cows in Dartington with a sufficiently accurate history, only 8 could be definitely classified as having used artificial insemination only. Seven of these came from 1 herd and 1 was a heifer which had aborted. No explanation for the 7 positive reactors in the 1 herd was obtained in spite of further investigation. In Somerset 30 (42 per cent.) positive animals had a history of natural service (Table XXVII). However, a further 32 (44 per cent.) positive animals had a history of breeding by artificial insemination only, as far as could be ascertained. This means that of 4,287 vaginal mucus samples taken at the 2 centres only 40 (0·9 per cent.) positives were from animals bred by

artificial insemination exclusively. It is probable that this small number of reactions was non-specific in character.

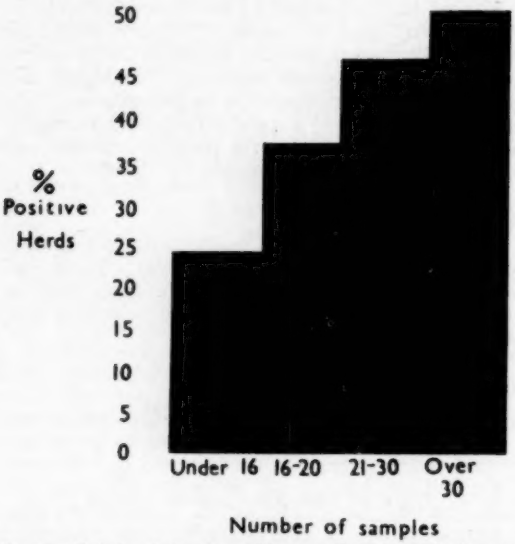

FIG. 4.—Relation between positive reactions to vaginal mucus agglutination test for *V. fetus* and number of samples taken.

TABLE XXVI
RELATION BETWEEN AGE AND VAGINAL MUCUS AGGLUTINATION TEST RESULTS FOR *V. fetus* (DARTINGTON HALL AND SOMERSET)

	Age (number of calves)					
	Heifers	1	2–3	4–6	Over 6	Total
Total ...	37	801	1,304	947	459	3,548
Number positive	—	23	31	52	20	126
Per cent. positive	0·0	2·9	2·4	5·5	4·4	3·6

Conception Rate

At Dartington 92 positive reactors had a conception rate of 63·0 per cent. with 52·6 per cent. for the negative material. In Somerset the positive animals had a conception rate of 60·7 per cent. compared with 66·4 per cent. in the negative animals in the previous gestation, and 51·7 per cent. compared with 56·2 per cent. in the current gestation. When account was taken of other factors known to affect fertility (Boyd & Reed) these differences, which in themselves were not statistically significant, no longer occurred.

It, therefore, does not appear that *V. fetus* plays a significant part in infertility problems in the herds being investigated.

Insemination Intervals

V. fetus infection is often associated with irregular oestrous cycles (Stegenga, 1950; Boyd, 1955). In Table XXVIII the vaginal mucus agglutination test results for Somerset are related to insemination intervals. This shows that there is no difference in any of the insemination intervals between positive and negative animals. A similar result was obtained at Dartington.

Incidence of Abortions and Stillbirths

In Table XXIX (Somerset) the incidence of abortions amongst vaginal mucus positive animals was 6·2 per cent. compared with 3·1 per cent. for negative animals. The positive reactors had a higher incidence than the suspicious ones but the numbers were too small to be conclusive.

Part III. Discussion of Both Infections

One of the first problems encountered in this field survey was the choice of herds. In the preliminary work at Dartington an attempt was made to work with an essentially random selection of herds. The disadvantage of a random sample in this type of field investigation rapidly became apparent. The preliminary Dartington material contained quite a number of herds with such poor records that reliable data of such things as age of cows, calving dates and use of

TABLE XXVII
BREEDING HISTORY OF ANIMALS POSITIVE TO THE VAGINAL MUCUS TEST FOR *V. fetus* (SOMERSET)

	Natural service		A.I. only		Unknown		Total	
	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
Suspicious animals	19	38	25	50	6	12	50	69
Positive animals ...	11	50	7	32	4	18	22	31
Total positives ...	30	42	32	44	10	14	72	100

Effect on Fertility

It has been suggested that some of these reactors are non-specific and that the others are a reflection of past infection. If this is correct one would not expect in view of the development of immunity, which occurs, to see much effect on fertility in the positive reactors in this material and this was found to be the case.

S19 could not be collected. A further disadvantage was the introduction of unnecessary variables which complicated the analyses without adding to the value of the results. National Milk Recorded herds were found to form the ideal material for the sort of work being done, as is well exemplified in the Somerset investigation. For homogeneity of material one breed was much more satisfactory than a mixture of

TABLE XXVIII
INTERVAL BETWEEN INSEMINATIONS AND VAGINAL MUCUS AGGLUTINATION TEST RESULTS FOR *V. fetus* (SOMERSET)

Gestation	Vaginal mucus test	Interval between insemination (days)										Total	
		Less than 18		18–24		25–35		36–48		More than 48			
		Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
Previous	–	40	3·4	598	50·9	105	8·9	192	16·3	240	20·4	1,175	100·0
	+	—	0·0	17	43·6	6	15·4	7	17·9	9	23·1	39	100·0
Current	–	63	4·1	676	44·4	146	9·6	255	16·7	384	25·2	1,524	100·0
	+	2	3·7	25	46·3	2	3·7	12	22·2	13	24·1	54	100·0

breeds. Furthermore, in this work from artificial insemination centres, it was desirable to avoid herds using natural service. Large herds were better to work with than smaller ones, because of the advantage of numbers in the analysis of results.

The selection of material in this manner has the disadvantage of not giving a representative picture of the condition being studied, but the gain in fullness and reliability of the basic data offsets this objection.

In the investigations into brucellosis, the milk ring test has proved of considerable value, although it has limitations which must be recognised. One of these limitations revealed in this work was the occurrence of presumed non-specific reactions in association with samples taken in late gestation. This effect developed suddenly in the fifth month of pregnancy and increased in strength until the end of gestation. The solids-not-fat content of the milk is lowest about 45 days *post partum* and highest in late lactation (Bailey, 1952). He showed that there was a greater rise after the sixth month of gestation than in late lactation and found that in barren cows there was no rise in solids-not-fat towards the end of lactation. These results resemble the variations in the incidence of ring positives. Pierce (1955) showed that the decline in

TABLE XXIX
RELATION OF VAGINAL MUCUS AGGLUTINATION TEST FOR *V. fetus* WITH THE ABORTIONS AND STILLBIRTHS (SOMERSET)

	Cows	Per cent. abortions	Per cent. stillbirths
Negative	2,374	3·1	3·1
Indefinite	45	4·4	4·0
Positive	20	15·0	0·0
Total positive ...	65	6·2	3·1

γ globulin in sera from cattle approaching calving may be associated with the concentration of the lacto-globulin in the udder. This point is amplified by Larson and Kendall (1957) and Larson (1958) whose calculations of the amount of β_2 and γ_1 globulins leaving the blood indicated that they quantitatively accounted for the immune globulin components appearing in the lacteal secretion. Kerr *et al.* (1959) also discuss the transfer of antibodies from serum to milk in the dry cow and during the colostral stage. They determined these antibodies by the use of whey tests using *Salmonella pullorum* and *Trichomonas fetus* as antigens. The problem of S19 vaccination reactions, however, still remain. The application of the knowledge of this gestation effect gave a closer correlation between positive ring test reactions and infertility.

The other important limitation of the ring test has been the effect of vaccination with S19, particularly in adults, in producing positive reactions. It has been clearly shown that this occurs independently of the stage of gestation. The whey test, which was also influenced by gestation stage appears to be less affected by adult S19 vaccination. Excluding the effect of gestation and field infection, no positive whey titres over 1 : 20 were given. Titres below this figure (1 : 10 and 1 : 20) were only given by animals which had been sampled within 14 months of adult vaccination. In this way the whey tube test may be superior to the serum agglutination test, which has been found unsuitable for differentiating vaccinal from genuine titres (Levi *et al.*, 1953, and Cameron, 1957). The whey tube test, however, may miss some infected animals. Ring test reactions of +, ++ and +++ have been regarded as positive on the basis of work by Ogonowski and McDiarmid (1954). However, it appears from Table XIII and the conception rate and abortion data from Dartington that ± reactions have more in common with positive than negative reactions and should not entirely be disregarded. Unfortunately there were no comparable figures for Somerset as the ring test results were read in only three categories, ± being included as negative.

One of the technical advantages of the ring test is the ease with which samples may be taken in the field and tested in the laboratory, another improvement over the blood test.

The vaginal mucus agglutination test has proved the most effective of the 3 tests in locating field infection, as the incidence of abortions amongst positive reactors has confirmed. Field sampling and laboratory techniques are both more laborious and time consuming than for the ring test.

From the literature it would appear that a combination of the ring test (Roepke *et al.*, 1950), and the whey agglutination test (Cameron, 1957) would detect almost as many infected animals as the serum agglutination test. Therefore, in the early stages of an eradication scheme, individual milk sampling would provide efficient screening by the ring test combined with some differentiation of S19 vaccination reactions by the whey test. Milk sampling would have to be repeated at suitable intervals to pick up those cows not in milk, in late gestation or newly calved at the time of sampling. A sampling interval of six months

would be suitable. The vaginal mucus agglutination test could be used as an adjunct in problem herds.

A particular disadvantage associated with vaginal mucus and blood sampling on a large scale is the disturbance involved in herd routine. This is an important consideration if co-operation of herd owners is to be obtained.

In the past it has been recognised that *Br. abortus* infection has been a cause of infertility. In the herds investigated S19 has been extensively used and appears to have controlled contagious abortion effectively. Nevertheless, in the limited infection present, infertility possibly due to *Br. abortus* infection has occurred in all groups of vaccinated and unvaccinated animals. This infertility effect was more clearly demonstrated when the gestation stage was taken into account. This rather confirms the hypothesis that late gestation was associated with many non-specific reactions. In Somerset the division of herds into infected and non-infected, on the basis of history and test results appears to have been justified. The differences in conception rate between the various categories of ring negative and positive animals, however, were not statistically significant. The fact that there was a larger number of positive reactions with the ring test than the vaginal mucus agglutination test, together with the small effect on fertility, suggests that udder infection may often occur independently of uterine infection. Perhaps the biggest difficulty in the interpretation of the ring test results is due to lack of basic knowledge about the test, the main question being whether the presence of agglutinins in the milk denotes udder, systemic or other localised infection. However, the small number of positive reactors with the milk and vaginal mucus test, and the fact that each animal was only sampled once, makes it impossible to clarify this question with the present data. The work of Kerr *et al.* (1959) does offer some guidance in this matter.

Neither positive individuals nor herds were associated with any consistent difference in insemination intervals from those of negative ones, suggesting that any effect of brucellosis on fertility occurs at an early stage preventing fertilisation or affecting implantation.

Systematic testing with the vaginal mucus agglutination test has revealed that *V. fetus* positive reactions were sporadic in their distribution throughout the herds under study. The positive reactions occurred mainly in older cows, and especially at Dartington in herds using their own stock bull. However, there was quite a high proportion of positive reactors which had been bred by artificial insemination exclusively. These reactions, representing only 0·9 per cent. of all the animals sampled, can most reasonably be explained as sporadic reactions, since all bulls at Somerset Cattle Breeding Centre were test mated for *V. fetus* and found negative. The same applied to Friesian semen at Dartington except in the case of one bull, which was not tested. This is supported by the fact that there was no significant fertility difference between reactors and the negative animals.

It is not suggested that *V. fetus* does not cause infertility, but that the reactions obtained in the 2 centres were not associated with active infection.

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(*Concluded at foot of col.* 1, *page* 875)

Current Literature

BOOK REVIEWS

Der Huf. Professor H. Ruthe. Gustave, Fischer Verlag, Jena Villengang, 2, Germany (1959). 17.25 DM.

This book deals with both horse-shoeing and veterinary surgical shoeing. It aims at the education of farriers as well as the instruction of veterinary students in this branch of animal orthopaedics. This first edition consists essentially of the anatomy and physiology of the foot, together with a description of the materials and methods involved in shoeing normal and abnormal feet. The treatment of the subject is essentially practical and the copious and clear illustrations make the text very easy to follow. There is a small appendix on the shoeing of cattle.

There is probably little that is new in the book and one wonders whether there was a pressing need for such a volume, but the author is obviously an authority on his subject and he has rendered a useful service by bringing together the essentials of shoeing for both the veterinary student and the farrier. The book is attractively produced.

Winter Keep on the Farm. Ian Moore. Farmer & Stock-breeder Publications Ltd., London (1960). 9s. 6d.

"The kale crop has immense potential as a means of cheaply and simply satisfying the food needs of cattle and sheep during the winter months." The opening sentence of the preface gives little indication of the wealth of information contained in the following chapters. Here is a splendid little book which deals not only with kale, but also with the other common winter foodstuffs, their cultivation and the methods by which they can best be fed.

To the student of crop husbandry and forage conservation it forms an interesting sequel to 2 earlier books by the Professor—*Crops and Cropping* and *Silage and Haymaking*.

To the veterinarian who is combating a rising incidence of metabolic disorders caused by nutritional disturbances it will provide a most valuable aid.

Investigation into the Incidence and Causes of Infertility in Dairy Cattle.—*Concluded.*

M'FADYEAN, J., & STOCKMAN, S. (1909). Rep. dep. Comm. Bd. Agric.
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Recent Research in Freezing and Drying. A. S. Parkes and Audrey U. Smith. Blackwell Scientific Publications, Oxford. 63s.

The history of biological research is punctuated by the discoveries of new techniques without which further fundamental advances in our knowledge of living matter would be impossible. Among these technical landmarks the uses of freezing and drying are outstandingly useful tools. Their use and understanding are widely appreciated in many fields of biological science and this book is an account of many of the rapid advances that have been made recently, presented to the Second International Symposium on Freezing and Drying in 1958. As A. S. Parkes, one of the editors, states in his foreword, "the study of the biological application of freeze-drying is one of the active growing points of science".

The papers are presented in five main sections: I Biophysics of Freezing, II Freezing of Living Organisms, III Biophysics of Freeze-Drying, IV Applications of Freeze-Drying to Micro-organisms, and V Freeze-Drying of Mammalian Tissues.

Sections I and III provide much of the basic biophysical background needed for an understanding of the techniques of freezing and drying. Sections II and IV contain material of great interest to bacteriologists, virologists, and those concerned with the preservation of semen.

Surgeons reading the papers in Section V will find the information on the freeze-dry storing of tissues for grafting fascinating, and it may well contain the foretaste of developments yet to come in veterinary surgery.

Diagnosis of Veterinary Parasitisms. J. H. Whitlock. Henry Kimpton, London (1960). 75s.

This work is an expansion of Professor Whitlock's previous book—*Illustrated Laboratory Outline of Veterinary Entomology and Helminthology*—, with which some readers will be familiar. The object of the present volume is to aid the veterinary practitioner and student in the identification of those parasites which cause disease in the domestic animals. In most cases the author has been content to provide only sufficient information for the identification of the genus to which the parasite belongs, but in some instances means of specific identification are provided. Keys are also provided for the identification of the infective larvae of the gastro-intestinal worms of cattle and sheep. The book contains much information, for example on life cycles, which is not strictly relevant to the identification of parasites and whilst a thorough study of the volume will enable the student to become competent in the identification of parasites the practitioner will not find it easy to use in the rapid identification of parasites which he may find in the course of his daily work. The book is copiously illustrated, many illustrations being original photographs of preparations by the author.

I.C.L.A. Symposium 1958 "Living Animal Material For Biological Research". Edited by W. Lane Petter. Published by the I.C.L.A. (1958).

The fundamental aim of the International Committee on Laboratory Animals (ICLA), an independent international body which was founded in December, 1956, is to enable biologists to obtain better laboratory animals for their work. ICLA receives support from UNESCO, the Council for International Organisations of Medical Sciences, and the International Unions of Biological and of Physical Sciences.

Up to the time of this Symposium, ICLA's main activities had been to arrange for national surveys of the production and utilisation of laboratory animals, and to stimulate the creation of national organisations which, while primarily concerned with the exchange of information about the production, supply and care of laboratory animals, would also in some countries be concerned with such activities as the training of animal technicians, the development of accreditation schemes for commercial breeders, and with research into special relevant problems. ICLA also produces a half-yearly Bulletin, and has begun a bibliographical service.

The future aims for ICLA, as stated on page 65 of this report, are "To act as an information exchange about the supply and management of laboratory animals; to continue the bibliographical service; to conduct further surveys and promote the creation of national laboratory animals organisations, and to act as a liaison between them; to designate primary type colony centres and list primary type colonies being maintained in such centres; to list sources of lower vertebrates and invertebrates; to encourage the training of animal technicians by the provision of training manuals in several languages, and in other ways; and to take any other steps that may seem desirable to improve the quality of laboratory animals."

The first symposium organised by ICLA was held in France in October, 1958, to consider the special requirements in certain fields of work in which the rôle of the laboratory animal is particularly important. This present publication reports the various papers delivered at the symposium, and gives salient points from the consequent discussions.

The first 7 papers outline the special role of laboratory animals in relation to cancer research (O. Mühlbock), to microbiology (with particular reference to the use of laboratory animals in diagnostic bacteriology, standardisation of biological products, and evaluation of antibiotics and chemotherapeutic agents) (S. Slopek), to the field of tissue and cell cultures (particularly in relation to the study of somatic cell genetics, and to the malignant or malignant-like transformations of cells in culture) (G. Klein), to endocrinological research (R. Courrier), to physiology (J. A. B. Gray), to radiobiology (J. H. F. Maisin), and to the pharmaceutical industry (D. G. Davey). The authors indicate what sort of animals they require or would like to see available, and the differing needs in the differing subjects are well demonstrated.

In the next part of the report, the Secretary-General, Dr. Lane-Petter, surveys the past activity and the future programme of ICLA. It is clear that ICLA has an important part to play in this field, and Dr. Lane-Petter's account shows a practical down-to-earth approach to the problems arising.

In the final part of this report, 4 rather more specialised papers are given under the general heading of "What can be done": E. S. Russell discusses the "Service function of mammalian genetics to biomedical research"; P. Lépine—Latent infections in laboratory animals; W. K. Hirschfeld—Large scale production; H. E. Pogosianz—The introduction of new species of animals into laboratory use.

This report would make interesting reading for any user of laboratory animals.

The Urine of the Dog and Cat: Analysis and Interpretation. F. Bloom. Gamma Publications, New York (1960). $3.75.

Those familiar with the author's *Pathology of the Dog and Cat* will expect a high standard in this small, essentially practical work, and they will not be disappointed. The subject matter is limited to those aspects that may be tackled by a veterinary surgeon without specialised biochemical apparatus, the instructions are clear, and the interpretations are brief and to the point, with references to further reading.

Urinalysis has definite limitations in veterinary clinical practice, not least from the difficulties associated with the collection of suitable samples. It will not surprise those acquainted with American practices that the author recommends catheterisation as the method of choice in both male and female dogs, and provides detailed descriptions of his suggested procedures.

The paucity of information on cat urine, and the obvious difficulties in obtaining samples except in metabolism cages, make this work essentially of value in canine practice where, it is to be hoped, it will enjoy a wide circulation. Moreover, it may create renewed interest in the author's major work, which has never received the attention it deserved.

Broilers. Eric F. Golden. Poultry World Ltd., London (1960). 2nd edition. 10s. 6d.

This book presents a detailed account of all the important aspects of broiler production from the breeding and rearing of chicks to the marketing of the finished product. Its comprehensive nature makes it a valuable source of reference to all those engaged in, or associated with broiler production. It is also suitable for providing the veterinarian with an outline of the management routines, peculiar to broiler production, a knowledge of which is essential for the effective treatment of the diseases of broilers.

Since the previous edition of this book appeared, many important changes have been made in methods of producing broilers, particularly where housing, ventilation and brooding are concerned. These changes, which are described in the present edition, have been introduced into the broiler industry to increase its efficiency and are therefore well worth the attention of the broiler producer who wishes to lower his production costs.

The book also includes 2 sections written by

specialists in nutrition and breeding. It is interesting in this respect to note how the special requirements of the broiler grower have stimulated the efforts of nutritionists and geneticists to provide for their needs. The section on nutrition by Dr. J. L. Williams provides a clear outline of the scientific basis for the new broiler feed formulations which are aimed not only in improving the feed conversion ratio but also the quality of the carcase. In the section on breeding and chick production, Keith Wilson discusses the optimal characteristics which should be present in the broiler chick and shows how the success with which such chicks have been bred renders the use of the hatchery waste chick for broiler production obsolete.

The section on disease control however is not quite up to the standard of the other sections. It is felt that greater service would have been rendered to the broiler producer by emphasising the necessity for obtaining correct diagnosis of disease and skilled advice on selection and mode of administration of the various chemotherapeutic substances mentioned. There are many for example, who will not share the author's confidence in the treatment of coccidiosis with dilute hydrochloric acid and in recommending the use of mass treatment for worm infestation. A warning should have been given of the dangers in broiler houses of such treatment resulting in a spread of infestation unless special measures are taken to avoid this occurring.

The general standard of production of the book is excellent and although a considerable amount of space is given to advertisements these are confined to an appendix and do not interrupt the text. The book is well indexed and can definitely be regarded as justifying its modest cost.

Diseases of Swine. H. W. DUNNE (Ed.). Baillière, Tindall & Cox, London (1960). 100s.

This is a text-book written for both the qualified veterinary surgeon and the student. Twenty-eight authorities, among them Biecester, Doyle, Kernhamp, Lindquist, Sampson, Shope and Traum, have given of their specialist experiences. The material, which is presented in an easy-to-read form, is well illustrated. It is divided into sections under anatomy and physiology, virus diseases, bacterial and mycotic diseases, parasitic infections, toxaemias and poisoning, miscellaneous conditions, surgery, and finally nutrition, feeding, and management.

The increasing tendency of American text-books to be all-embracing is once more exemplified. Whilst in so many cases this has exacted the penalty of drastic condensation of the available information and lessened the overall value of the book, such is not the case here. It is, nevertheless, fortunate that buildings and their impact on health and production are excluded; apart from this the comprehensiveness of this volume may well appeal to many potential readers in this country.

In the disease section there are a number of conditions such as dysentery and some varieties of parasites, which appear to have little application here. Yet who knows? They may exist undiagnosed or appear in due course. These, and the references to mycotic conditions, general toxaemias including those of botulism and the fungal toxins, and the problems of photosensitisation, open up new avenues of thought; they will undoubtedly enable the British reader to reflect more carefully on those obscure conditions which he is meeting more and more often in the field and perhaps enable him to shed some light on them. The chapter on protozoal diseases, covering coccidia, trypanosomes, and *Balantidium coli* infection is significant in this respect.

The fact that there is only a brief reference to the possible association of haemolytic *E. coli* in the chapter on oedema (sensibly spelt edema, should anyone wish to look it up) suggests that this work was completed before the publication by a number of research workers in this country of results incriminating certain serological strains of *E. coli*. In contrast, the inclusion of a chapter on the latest methods of rearing disease-free pigs, written by G. E. Young, brings this book right up to the moment.

Operative techniques, which constitute a welcome contribution, methods of restraint, and that intriguing subject of nutritional deficiencies, offer much to the practical and to the diagnostician.

The enthusiast can always yearn for more, and in this respect one might be disappointed not to discover any reference to mulberry heart disease or *hepatitis dietetica*, but there are few who could claim to have caught up with this book already and would not benefit in some way by reading it.

Sheep Management and Diseases. By H. G. BELSCHNER. Angus & Robertson Ltd., London (1960). 90s.

The excellence of production of this completely revised enlarged (6th) edition of a now well-established text-book is a tribute to its publishers.

The author writes from an exclusively Australian experience and principally for Australian readers. It is understandable therefore why emphasis is given to some matters which a reader in this country might reasonably consider less deserving; thus the great importance of wool to the Australian sheepman and the difference of climate and grazing conditions causes the author to deal in great detail with such subjects as wool production, breeds of relative importance, blowfly-strike, dipping, drought feeding, supply of water, and conditions arising directly or indirectly from lack of water, for example botulism. Nevertheless one misses even a passing reference to the management of mountain-sheep, and to certain specific diseases such as louping ill, enzootic abortion, jaagziekte, and foot-and-mouth disease, and would wish a little more detail about others such as scrapie, hypomagnesaemia, and post-parturient gas gangrene. It is equally disappointing to find so few references to the contributions of British workers in this field in an otherwise useful and extensive bibliography at the termination of each chapter.

Rearrangement of some of the chapters could provide a better continuity and so reduce to a minimum a certain amount of otherwise unnecessary repetition. Thus "Breeds of Sheep" (Chapter 2) might be

more appropriately followed by "Some Aspects of Breeding" (Chapter 7) and the "Keeping of Records" (Chapter 8) before introducing the subject of "Crossbreeding for Wool and Mutton Production" (Chapter 3). "Buildings, Yard and Fences" (Chapter 9) could well precede "Sheep Husbandry" (Chapter 4), whilst the appearance of an exhaustive chapter (9) on "Blowfly Strike" among the chapters concerned with management rather than under the more usual umbrella of "Parasitic Diseases—External Parasites" (Chapter 23—II) seems a little out of context.

Differences of opinion might also arise over minor points connected with some of the specific diseases with which the author deals; for example, the occurrence of even "acute" lamb dysentery without ulcer formation must be regarded as extremely rare. For this reason this inclusion of a portion of affected bowel is an important omission from material sent for laboratory diagnosis. In connexion with the prevention of lamb dysentery the second injection of vaccine in the ewe is best given a week earlier than advised: 2 weeks before lambing. Copper sulphate and arsenical footbaths for the preventive treatment of foot-rot are now largely superseded in the United Kingdom by formalin. A false impression might also be created here in assigning the aetiology of "Infectious pneumonia" to the "bacillus of Freidlander sometimes referred to as Klebsiella pneumoniae."

Reference to hypocalcaemia as being most frequently encountered in in-lamb ewes appears a little incongruous when in the United Kingdom it occurs far more frequently after lambing and is given the name of lambing sickness or milk fever and never grass tetany or grass staggers—terms reserved for hypomagnesaemia, which appears not to be recognised as an entity in Australia. Nevertheless, much in the description of the clinical symptoms and predisposing causes given in connexion with the former would seem to fit the latter condition equally well. However, there are no grounds for believing, as claimed, that the addition of ground limestone to the diet will prevent hypocalcaemia as met with in this country. One is also a little surprised that fasting of sheep prior to dosing with carbon tetrachloride is not recommended, being regarded here as a most important measure to reduce the toxic effects of the drug. The use of the recently introduced molluscicide copper pentachlorophenate in liver fluke control is not recommended in the United Kingdom owing to its toxic properties and the resulting potential risk to operators using it.

Nevertheless with these essential reservations and a few minor points of difference the author succeeds to a remarkable degree in combining in one volume a vast amount of practical information relative both to disease control and to flock management, leaving the reader in no doubt as to the dependence of the one upon the other—a fact which could, with benefit, be appreciated by veterinarians and stock-owners alike in any country. Its treatment of the subject with its emphasis on the practical approach to preventive medicine through management has provided an ideal book not only for the veterinary student and graduate but for all directly concerned with the health and the productivity of sheep. Dr. Belschner is to be congratulated.

Leitfaden Der Zeigenkrankheiten (Diseases of the Goat). By WILHELM SHULZE. S. Hirzel Verlag, Leipzig (1960). 9.90 DM.

This little book, written in German, is well produced and freely illustrated. All the well-known and less well-known conditions of the goat are referred to, providing a comprehensive reference work for those interested in the pathology and the husbandry of this animal.

Sections are classified in an orthodox manner under the names of the particular organs concerned, *e.g.* diseases of the urinary system, of the liver, heart, lungs, etc., and there are also sections on infectious diseases due to viruses, bacteria, etc.

It is only too clear from this book that the goat is no more free from the common diseases encountered on the farm than other ruminant animals and can suffer equally acute infectious diseases or vitamin or mineral deficiencies.

Tetanus, tuberculosis, and Johne's disease are all described as occurring not infrequently. In 1948, 7 out of 135 goats received at the Dresden slaughterhouse, revealed lesions of tuberculosis, and in another instance where 40 strains of *M. tuberculosis* were isolated from goats, 39 were of the bovine type and one of the avian type. This evidence once again contradicts the popularly held and often advertised view that the goat is immune to tuberculosis.

A section on abdominal surgery is also included and on the varied aspects of artificial insemination. There is much useful information and advice provided which should make this publication a welcome addition to the library of the veterinarian taking an interest in the welfare of this thrifty though destructive ruminant.

If the Gown Fits. A. P. ROWE, C.B.E. Cambridge University Press, London (1960). 30s.

Dr. Rowe, who has recently completed a 10-year period spent as Vice-Chancellor of the University of Adelaide, has written this book to explain why, as a result of his experience, he feels that, while "there are exceptional universities and exceptional university departments, in general, universities are not producing results commensurate with the money which taxpayers spend upon them." The author's words are directed principally to the intelligent Australian taxpayer, but the book has in it much that is of wider implication, and Dr. Rowe has many shrewd and searching comments to make on many aspects of universities in general—their organisation, their functions, their staff and students, and their relations with other organisations—and he puts forward a broad plan for university reform.

The book is written in a lively and at times controversial fashion, and it is to be commended to all veterinary teachers, who will, at some time or other, have felt, with Dr. Rowe, that all is not well with universities. In particular, professors will find this book salutary and bracing reading.

The Ladies' Guild, V.V.B.F.

The 29th annual general meeting of the Ladies' Guild was held on September 1st in the Queen Margaret Union of the University of Glasgow.

The President, Mrs. W. Mitchell, was in the chair and the attendance book was signed by Mesdames Jennings, Erica Thomson, Harkness, Stobo, Wright, Corregall, Donald, Chapman, Roberts, Nisbet, Mackay, Greig, Lawson, Begg, B. W. Anderson, Wilson, Barclay, Buie, J. M. Thomson, Shanks, Semple, Ingram, Coward, Stuart, Sellers, Fleming, McKellar, J. I. Anderson, and Field (hon. sec.).

Apologies for absence were received from Mesdames Glover (hon. treas.), J. N. Ritchie, Locke, Sutherland, Lloyd, Service, Forbes Ritchie, Lowndes, Sutton, L. P. Pugh, and Hebeler.

Mrs. Mitchell extended a warm welcome to all the members present and thanked those who had nominated and elected her as President. She said she was sure everyone would sympathise with Mrs. J. N. Ritchie in her husband's sudden illness and she proposed that a letter be sent to Mrs. Ritchie from the meeting offering good wishes for his recovery.

Minutes

The Minutes of the last A.G.M. were read, passed and signed.

Arising from the Minutes

It was decided to try once again to hold a meeting during the B.S.A.V.A. Congress in London next spring.

Correspondence

During the past year letters have been received from the Social Committee of the B.S.A.V.A. Congress, the organising secretaries of the 1961 B.V.A. Congress to be held in Oxford, Dr. F. Bell, the Editor and Assistant Editor of THE VETERINARY RECORD, Mr. Francis of the V.V.B.F., the Association Française des Femmes de Vetérinaires, and from Mrs. Glover.

Arising from the Correspondence

The hon. secretary was asked to thank Dr. F. Bell for having acted as hon. auditor in the past and to enquire if Dr. Cotchin would be willing to act as hon. auditor for 1960-61.

Mrs. Glover wrote tendering her resignation as hon. treasurer as she felt that the time had come to hand over to a younger member. She proposed the nomination of Mrs. Erica Thomson as her successor. The hon. secretary was requested to write immediately to Mrs. Glover, accepting her resignation with deep regret and thanking her for many years of willing service and helpful co-operation and for her wise stewardship which during her term of office had promoted the growth of the Ladies' Guild contribution to the V.V.B.F. from £150 in 1943 to £1,500 in 1960. As a small token of their affection and appreciation the members present contributed to a gift to take the form of a cut-glass vase filled with flowers to be sent by the President.

The annual report was presented by the hon. secretary Mrs. Field as follows:—

Those members who were present at the annual general meeting at Folkestone last September will remember that we were unanimous in our wish to have Mrs. Mitchell as our President, but as she was in Canada at the time, there was no means of knowing that she would accept the nomination. I would like therefore on your behalf to thank her for graciously accepting office and say how pleased we all are to see her in the chair. Scottish members do not need me to tell them of the great interest Mrs. Mitchell has always taken in the aims of the Ladies' Guild since she was for many years the Scottish chairman. This year I have not received as much news from the Divisions as I did last year, perhaps because I was unable to write my "begging-for-news" letters quite so early. Dances were held in 4 Scottish Divisions, in N. Wales and S. Wales, Herts. and Beds., S. E. Midlands and N. Ireland, and our President organised a very successful garden party in July. From the news received it is obvious that these functions are not only money-making efforts but also very happy social occasions. This was certainly true of the dance organised by Mrs. J. N. Ritchie. Ladies' Guild members in N. Wales, S. Wales, Herts. and Beds. and N. Ireland meet regularly. The members in N. Ireland had a day's outing to Portrush, Co. Antrim, 2 coffee parties with bring-and-buy sales and a supper following their A.G.M. The financial outcome of all these activities will be revealed in the hon. treasurer's report. One new Division, the Lakeland, has been formed in Lancashire.

For the past year I have represented the Ladies' Guild at the council meetings of the V.V.B.F. This, I assure you, is a great privilege. I understand now, only too well, the necessity for continued and increasing support for the V.V.B.F. Many cases which come up for consideration do not need long-term help such as the State might give, but immediate financial assistance to help tide them over difficult periods. Gifts in this category, together with the Christmas and midsummer gifts are of the utmost importance. Most of the money in the Special Gift Fund comes from the Ladies' Guild, which is always mentioned in the letters accompanying the cheques which Mr. Francis sends out.

The meeting held during the B.S.A.V.A. Congress in London in March was badly attended, only 11 people were present including the chairman, Mrs. Erica Thomson the hon. treasurer, and the hon. secretary. The B.S.A.V.A. Congress Social Committee went to much trouble and some extra expense on our behalf to arrange this meeting.

I wish to thank Mrs. J. M. Thomson and the Ladies' Committee of the West of Scotland Division for making all the arrangements for the holding of this A.G.M., and the Ladies' Guild dance which I am sure we are all going to enjoy this evening.

I wish to thank Dr. F. Bell for acting as our hon. auditor once again, Mr. Mitchell, the Editor of THE

VETERINARY RECORD for printing everything I have sent to him, and to Mr. Francis, secretary of the V.V.B.F. and Mrs. Glover for her unfailing kindness and helpful advice at all times.

Hon. Treasurer's Report

The hon. treasurer's report was read by Mrs. Erica Thomson:—

After my long term in office for the Ladies' Guild it is obvious that writing my last report is tinged with regret. However, it is in the best interests of the Guild that a younger member should take over and infuse new blood and new ideas into it.

I am quite delighted to be able to give such an excellent report to end my treasurership. Details of money received this year are in your hands and the sum in excess of this—shown in the balance—is, of course, the amount left in last year.

The cost of printing may appear heavy but purchase tax adds to it quite considerably. However, I feel it is offset by the facts that we've no other expenses this year and have had no printing for 4 years.

Support has been maintained splendidly in all the Divisions and social events well attended and much enjoyed. To all who organise them most sincere thanks and appreciation. The calls on the V.V.B.F. are continuous and the gratitude of all recipients is very real and often most moving.

The balance at the bank, as you have heard, is £1,538 which is most heartening, and is £145 more than last year.

	£	s.	d.
Proceeds of Dance £200 16s. 6d. and Tombola and Programmes at Folkestone £148	348	16	6
Central Division	36	6	0
Dance arranged by Mrs. J. N. Ritchie	42	9	8
Eastern Counties Division	25	17	0
Herts. and Beds. Division	18	0	0
Proceeds of Dance in Herts. and Beds.	55	0	0
Lancs. and Cheshire Division	26	0	0
Lincolnshire Division	11	17	0
Midlands Division	15	13	0
S.E. Midlands Dance and Party	80	0	0
Eire	76	17	6
N. Ireland	101	0	0
N. Wales Proceeds of Dance	60	0	0
S. Wales	50	0	0
Hon. Treasurer's Subscriptions and Donations	73	1	0
Scottish Division Subscriptions and Donations	90	7	3
Dance arranged by Mrs. Wilson at Ayr ...	88	0	0
Dance arranged by Mrs. Kennedy at Dumfries	68	7	3
Dance arranged by Mrs. Barr at Penrith ...	72	15	6
Dance arranged by Mrs. Service at Aberdeen ...	49	10	0
Garden Party: Mrs. Mitchell	66	10	0
	£1,456	7	8

The adoption of the report was proposed by Mrs. Harkness and seconded by Mrs. Roberts.

It was resolved that £1,000 be allocated to the Current Relief Fund and £500 to the Special Gift Fund.

Election of Officers for 1960-61

President: Mrs. S. Jennings.
Hon. Treasurer: Mrs. Erica Thomson.
Hon. Secretary: Mrs. H. I. Field.

The meeting approved the change of signature on all cheques from that of Mrs. D. I. Glover to that of Mrs. Erica Thomson.

Other Business

It was suggested that in future the wife of the President-elect B.V.A. be invited to be President of the Ladies' Guild for the same term of office as her husband.

Mrs. Wright proposed and Mrs. Erica Thomson seconded a motion that in future the expenses of the hon. secretary to attend the A.G.M. should be paid by the Guild. The meeting had by now overrun its allotted time and Mrs. Wilson proposed that in future a whole morning be set aside for the A.G.M. This met with the full approval of the meeting and it was decided to adjourn the present session until the following morning. The meeting resumed at 10 a.m. on September 2nd.

The hon. secretary asked leave to try to reform the Standing Committee in accordance with Rule 3. If the Guild is to continue to expand in the future as it has done in the past more help and support are needed by the 3 executive officers. It was proposed that the secretary write to several members inviting them to join the committee until such time as nominations can be received from the Divisions, and that this commitee should consider the rules and submit them for discussion at the next A.G.M. If possible the committee should meet twice yearly, one meeting to be held during B.V.A. Congress week.

The hon. secretary was asked to send copies of the Minutes, Rules and A.G.M. agendas to every member of the Ladies' Guild.

Mrs. Wilson proposed a vote of thanks to the President, hon. treasurer and hon. secretary for their work during the past year. This was seconded by Mrs. Lawson and carried with acclamation.

PRINCESS ROYAL'S CATTLE IN FOOT-AND-MOUTH OUTBREAK

It is reported that after talks lasting more than 24 hours, the Ministry of Agriculture ordered the destruction of most of the Princess Royal's prize-winning £50,000 herd at Holme Farm, between Leeds and Harrogate. Foot-and-mouth disease was confirmed on the farm on Monday.

Only 14 young heifers of the pedigree herd of Red Polls were reprieved, together with 56 Hereford cattle and 200 sheep including a number of the rare St. Kilda breed. The Ministry ordered the destruction of the other 66 Red Polls, 224 Herefords and 440 sheep on the 1,300-acre Harewood estate.

The disease was first confirmed among 10 Herefords. Unfortunately, most of the Red Polls had to be destroyed because they had mixed with the Herefords on Holme Farm.

News and Comment

THE ROYAL VETERINARY COLLEGE

The official opening of the session and presentation of prizes took place in the Great Hall of the College on October 4th. The guest of honour was Professor H. G. Sanders, Chief Scientific Adviser to the Ministry of Agriculture, and the Chair was taken by Professor Sir Charles Lovat Evans, Chairman of the College Council. After brief introductory remarks the chairman invited the Principal of the College, Dr. Glover, to deliver his Report.

Dr. Glover began by saying that the Senate of the University of London had recognised the College as a school in the Faculty of Medicine without time limit. There had been what Dr. Glover described as a "probationary period" but this had now been successfully passed. The Senate had also approved the regulations for the degree of Master of Veterinary Medicine and it was intended that this should be a degree of high standing. It was hoped that many people would register for it. There would be two ways of obtaining the degree—either by examination and dissertation or by thesis.

Dr. Glover then referred to the retirement of Professor Bosworth who had been associated for very many years with the College and had been a member of its academic staff for 21 years. Professor Bosworth had made a great contribution both to the scholarship and to the social life of the College and it was most fitting that his services had been recognised in that he was now created Emeritus Professor. Dr. Glover referred also to the retirement of Mrs. Mitchell, formerly registrar, and to Mr. Taylor of the College library staff. He welcomed as a newcomer, Dr. Holton, who was to be Reader in Biochemistry.

The College had once again benefited from various benefactions. Among them was the gift of an electron microscope from the Department of Health Education and Welfare, Bethesda, U.S.A., and this was in recognition of the high regard in which Professor Amoroso was held. Other benefactions had been received from the British Empire Cancer Campaign. The Agricultural Research Council, the Nuffield Foundation and the Glaxo Foundation.

The Principal was glad to make it known that the plans for the new student's hostel at the Field Station had been approved by the University Grants Committee. Other plans for the extension of the Field Station were under consideration.

The chairman next introduced Professor Sanders who presented the prizes and afterwards gave an address. Arising from his first-hand and specialist knowledge he stressed the importance of disease control in lowering costs in the agricultural industry. Science was having a great impact on farming but a greater still, he felt, on the veterinary profession which was evolving at a speed which seemed to him "fabulous." In addressing the students particularly, he recalled the old-time veterinary surgeon who, though far less academically qualified than were to-day's graduates, had a remarkable clinical instinct and a fund of common sense. He hoped the veterinary surgeons of the future would not turn their backs upon these assets. Professor Sanders referred to the freedom from bovine tuberculosis of the whole of Britain which had been declared on October 1st. He could easily remember the time when it was taken for granted that 40 per cent. of cattle reacted to the tuberculin test. The eradication of bovine tuberculosis was a great credit to the profession and he wished that the Chief Veterinary Officer had been well enough to be present that day so that Professor Sanders could say this to his face. (Applause.)

The rapid progress of farming was creating new problems and it was the profession's task to face and overcome these. Veterinarians must move in an increasing degree towards becoming advisers on preventive medicine, and the guides, philosophers and friends to the livestock industry in all its branches.

A vote of thanks to Professor Sanders was proposed by Professor Amoroso and seconded by Mr. Bleby, President of the Student's Union Society.

JURY SERVICE

The Registrar of the Royal College of Veterinary Surgeons would remind all veterinary surgeons and Supplementary Veterinary Register practitioners practising in the United Kingdom that this is the time of year to obtain exemption from Jury Service.

It must be emphasised that exemption from Jury Service is not automatic.

Liability to jury service depends upon inclusion in the local jury book which is compiled each year from the Electoral Registers. On these Registers the names of all persons who are, on October 10th in each year, qualified and liable to serve as jurors are marked with the letter "J."

Members have probably filled up a form recently asking them to give the names of all occupants of their households who are eligible to vote. During the period November 28th—December 12th, 1960, the lists compiled after the return of these forms will be displayed in town halls, post-offices and other public places. They may there be inspected, and if the letter "J" is marked against a member's name and he wishes to obtain exemption from jury service, he must write to the Electoral Registration Officer for his area and point out to him by not later than December 12th that he is exempt.

The authority which should be quoted in the letter is Section 24 of the Veterinary Surgeons Act, 1948, which reads: —

"(1) No member of the Royal College of Veterinary Surgeons, and no person for the time being registered in the Supplementary Veterinary Register, shall if actually practising veterinary surgery be liable to serve on any jury.

(2) This section shall not extend to Northern Ireland."

ANIMAL HEALTH TRUST LUNCHEON

The Duke of Norfolk, President of the Animal Health Trust, will preside at a luncheon on October 17th, to be held at the Hyde Park Hotel, London. Among those who have accepted invitations are the Minister of Agriculture; the President of the B.V.A.; the Duke of Devonshire; Lord Rank; the President of the National Farmers Union, and representatives of the R.C.V.S., the Universities, senior permanent officials of the Ministry and of numerous research institutes and learned bodies. In all about 200 guests will take luncheon and afterwards hear a report of the Trust's progress.

MR. A. J. HANS: SUCCESSFUL APPEAL AGAINST R.C.V.S. DISCIPLINARY COMMITTEE

In the Queen's Bench Division of the High Court of Justice the Divisional Court allowed with costs an appeal under section 18 of the Veterinary Surgeons Act, 1948, by Mr. Arthur Joseph Hans, of Alexander Road, Shirley, Southampton, from the order of the Disciplinary Committee of the Council of the Royal College of Veterinary Surgeons constituted under section 4 of the Act, of 1948, sitting on November 12th, 1959, that his name be removed from the Register of Members of the College and substituted a two years' suspension.

The appeal was heard by the Lord Chief Justice, Mr. Justice Ashworth and Mr. Justice Elwes.

B.V.A. CONFERENCE ON HYPOMAGNESAEMIA

May we remind readers again of the importance of sending in their applications for this conference as soon as possible The dates of the conference are November 23rd and 24th.

Application forms were included as loose inserts in THE VETERINARY RECORD of September 10th, in which the provisional programme was published. However, for those members who may have mislaid their application forms and would find it more convenient to write for tickets, the cost for the two days is two guineas, and tickets are transferable to enable members of a practice to share a ticket between them, if they cannot all attend the whole conference.

Details needed at B.V.A. Headquarters are: name and address of applicant; number of tickets required; and an intimation that a place at luncheon will be required for one or both days.

THE ANIMAL HEALTH DIVISION

The following changes have been made in the veterinary field staff:—

Mr. L. Hughes, C.B.E., Deputy Chief Veterinary Officer, Tolworth, retired from the Service on September 30th, 1960.

Mr. A. G. Beynon, formerly Regional Veterinary Officer, Welsh Region, promoted Deputy Chief Veterinary Officer at Tolworth with effect from October 1st, 1960.

Mr. H. M. M. Duff, formerly Deputy Regional Veterinary Officer, West Midland Region, promoted Regional Veterinary Officer, Welsh Region with effect from October 1st, 1960.

Mr. J. W. R. Pearce, formerly Divisional Veterinary Officer, Reading, promoted Deputy Regional Veterinary Officer, West Midland Region with effect from October 1st, 1960.

Mr. J. Birtwistle, Veterinary Officer stationed at Buxton retired from the Service on September 30th, 1960.

Miss P. Curwen, Veterinary Officer who was stationed at Truro has resigned.

UNIVERSITY NEWS

Glasgow

The following passes are announced in the recent professional examinations for the degree of B.V.M. and S.:—

3rd Professional Examination

PART I: PHARMACOLOGY AND MATERIA MEDICA

Galbraith, B. D.; Guthrie, I. L.; Porter, W. L. R.; Rushton, R. B.; Sowter, R. M.; Wilson, R. J. W.; and Wright, W. B.

3rd Professional Examination

PART II: PATHOLOGY, BACTERIOLOGY, PARASITOLOGY

Abraham, J. A.; Carlile, J. L.; Evans, Miss J. I.; Hughes, R. E.; Morrison, A. N.; Nyarko, D.; Pack, K. A.; Stewart, I. A.; Sutherland, G. D. M.; and Wheeldon, Miss A.

3rd Professional Examination

PART III: ANIMAL HUSBANDRY AND PREVENTIVE VETERINARY MEDICINE

Pack, K. A.; Weir, F.; and Young, R. G.

Edinburgh

The undermentioned candidates have passed the Third Professional Examination (Part I) in Veterinary Pharmacology for the degree of Bachelor of Veterinary Medicine and Surgery:—

Aird, James Gordon S.; Bishop, Keith F. S.; Brown, Byron J.; Doe, Ian; Forbes, Anne; Gordon, Angus S. M.; Grant, Donald G. A.; Hill, Michael R.; Hislop, Christopher R. B.; Jackson, Peter S.; Taylor, David R.; Whaley, Francis H.; and Wheeler, Michael R.

Liverpool

Degree of B.V.Sc. Third Examination

PART II: VETERINARY PATHOLOGY, INCLUDING MICROBIOLOGY AND PARASITOLOGY

Bush, B. M.; Carding, A. H.; Kemble, P. R.; Proudlove, A. J.; and Smith, B. J.

Third Examination

PART III: ANIMAL HUSBANDRY

Kemble, P. R.; Malone, J.; Proudlove, A. J.; and Smith, B. J.

Third Examination

PART I: PHARMACOLOGY

Hallows, B. J.; Hammonds, Patricia; Jones, T. O.; Pierrepoint, C. G.; and Rutherford, D.

THE REGISTER OF VETERINARY SURGEONS

On September 30th, the under-mentioned gentlemen were admitted to membership of the Royal College of Veterinary Surgeons in virtue of the registrable degree of B.V.Sc. of the University of Liverpool:—

Davies, Jenkin Owen, Pen-y-Graig Farm, Pontardawe, Glam.; Fitton, Michael William, 53 Carr Mill Road, St. Helens, Lancs.; and Zanetti, Peter Joseph, 78 Towers Road, Liverpool, 16.

PERSONAL

Mr. F. J. Peritz, Veterinary Officer in the Animal Health Division of the Ministry of Agriculture, Ghana, has been promoted Principal Veterinary Officer in the same Division.

Births

STATHAM.—On September 16th, 1960, to Pamela (*née* Johnson, M.R.C.V.S.) and Geoffrey Statham, a son, Peter John, brother to Roderick.

WALTERS.—On October 9th, 1960, to Anne (*née* Cassam) and Tom Walters, B.V.SC., M.R.C.V.S., Wyndhurst Lodge, Newgate, Haverfordwest, a son, Mark Howard.

Marriage

BABOS—FISHER.—On Monday, September 26th, 1960, at Stanmore Church, Middlesex. Pazaschos Babos, B.SC., of Mytilene, Greece, to Betty Margaret Fisher, B.VET.MED., M.R.C.V.S.

MR. LUKE O'DOWD

Mr. David Burgess writes :

Mr. Luke O'Dowd passed away peacefully on the evening of July 31st, 1960. After leaving Ireland for South Africa in 1921, he had a varied career. He left government service to settle in Wynberg, a suburb of Capetown and developed a clientele of the racing world, cattlemen and dog lovers. His twinkling Irish blue eyes were a passport to jovial company, and his clients were his friends. His independence of thought; lack of respect for bureaucracy and "leg up" for the underdog, made him a champion amongst the coloured folk. "Apartheid" was not in his dictionary.

His passing, closes an era of the real " horse vet " —a product of years and years experience with horses.

Our sympathy goes to his wife and children.

COMING EVENTS

October

15th (Sat.). B.S.A.V.A. NORTH WEST REGION. Meeting at the Bull and Royal Hotel, Preston, 8 p.m.

18th (Tues.). MID-WEST VETERINARY ASSOCIATION. Dinner-Dance at the Berkeley Café, Clifton, Bristol.

WEST WALES VETERINARY CLUB. Meeting at the Golden Lion Hotel, Carmarthen, 7.45 p.m.

19th (Wed.). SUSSEX VETERINARY SOCIETY. Meeting at the Dudley Hotel, Lansdowne Place, Hove, 2.30 p.m.

SOUTH EASTERN VETERINARY ASSOCIATION. Meeting at the Royal Star Hotel, Maidstone, 2.30 p.m.

WARWICKSHIRE VETERINARY CLUB. Meeting at the Regent Hotel, Leamington Spa, 8 p.m.

R.S.M. SECTION OF COMPARATIVE MEDICINE. Meeting at 1 Wimpole Street, London, W.1, 5 p.m.

SOUTHERN COUNTIES VETERINARY SOCIETY. Meeting at the Royal Hotel, Winchester, 7.30 p.m.

20th (Thurs.). SOCIETY OF WOMEN VETERINARY SURGEONS. Autumn Meeting at the Department of Veterinary Surgery, University of Bristol, Langford, Somerset, 2 p.m.

WEST OF SCOTLAND DIVISION. Extraordinary general meeting at the University Veterinary Hospital, Bearsden Road, Bearsden, 7.30 p.m.

ESSEX VETERINARY SOCIETY. Meeting at the Saracen's Head Hotel, Chelmsford, 7.30 p.m.

HERTS. AND BEDS. VETERINARY SOCIETY. Meeting at the Peahen Hotel, St. Albans, 7.30 p.m.

21st (Fri.). SCOTTISH METROPOLITAN DIVISION. Annual Dinner-Dance at the Carlton Hotel, North Bridge, Edinburgh, 8 p.m.

26th (Wed.). WELSH BRANCH. Meeting at the Belle Vue Hotel, Aberystwyth, 2.15 p.m.

STAFFS. AND DERBYS. CLUB. Meeting at the White Hart, Uttoxeter, 8 p.m.

27th (Thurs.). SOCIETY FOR THE STUDY OF ANIMAL BREEDING. Meeting at 1, Wimpole Street, London, W.1, 11.30 a.m.

28th (Fri.). SOUTH WALES DIVISION. Annual Dinner-Dance at the Park Hotel, Cardiff, 8 p.m.

YORKSHIRE VETERINARY SOCIETY. Meeting at the Royal Station Hotel, York, 2.30 p.m.

31st (Mon.). EAST YORKSHIRE CLINICAL CLUB. Meeting at the Talbot Hotel, Malton, 8 p.m.

November

4th (Fri.). A.V.T. & R.W. SOUTHERN REGION. 17th meeting at the Royal Veterinary College, Royal College Street, Camden Town, London, N.W.1, 11 a.m.

9th (Wed.). EASTERN COUNTIES VETERINARY SOCIETY. Autumn Meeting at the School of Veterinary Medicine, Madingley Road, Cambridge, 11 a.m.

11th (Fri.). V.V.B.F. NORTH OF SCOTLAND DIVISION. Annual Dinner-Dance in the Northern Hotel, Aberdeen, 7.30 p.m.

17th (Thurs.). DUMFRIES AND GALLOWAY V.V.B.F. LADIES GUILD. Annual Buffet Dance at the Cairndale Hotel, Dumfries, 8 p.m.

23rd and 24th (Wed. and Thurs.). B.V.A. CONFERENCE ON HYPOMAGNESAEMIA. Meetings at the Victoria Halls, Southampton Row, London, W.C.1, commencing 10.30 a.m. each day.

December

2nd (Fri.). NORTH OF ENGLAND VETERINARY MEDICAL ASSOCIATION. Annual Dinner-Dance at the White Swan Hotel, Alnwick.

B.V.A. COMMITTEE AND COUNCIL MEETINGS

Tuesday, November 15th, at 7, Mansfield Street
5 p.m. Finance Sub-Committee.

Wednesday, November 16th, at 7, Mansfield Street
10.30 a.m. Small Animals Committee.
12 noon Parliamentary and Public Relations Committee.

2.15 p.m. Veterinary State Medicine Committee.
4 p.m. Home Appointments Committee.

Thursday, November 17th, at 7, Mansfield Street
10.30 a.m. Farm Livestock Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, November 18th
10.15 a.m. Council Meeting in the Connaught Rooms, Great Queen Street, London, W.C.2.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth Disease

Yorks. Harewood Home Farm, Harewood, Leeds (Oct. 10).

Fowl Pest

Cambs. Ely Road, Little Thetford, Ely (Oct. 4); Bedwellhey, Little Thetford, Ely (Oct. 8); Halfway House, Cambridge Road, Ely; The Acacias, Little Thetford, Ely (Oct. 9).

Dorset. Broadlands Nursery, Ringwood Road. Three Legged Cross, Verwood, Wimborne; Park Vale, Burks Lane, Mannington, Wimborne (Oct. 3); Wonston Farm, Haselbury Bryan, Sturminster Newton (Oct. 4); Greylands, Leigh Sherborne; Deep Lane Farm, Chetnole, Sherborne (Oct. 5); Picketts Farm, Pulham, Dorchester (Oct. 6).

Essex. High Birch Poultry Farm, Weeley, Clacton-on-Sea (Oct. 8).

Lincs. Green Lane, Lincoln Road, North Hykeham (Oct. 4); 160 Lincoln Road, North Hykeham; Poplars Farm, Lincoln Road, North Hykeham; 241 Lincoln Road, North Hykeham (Oct. 5); 27 Station Road, North Hykeham (Oct. 9).

Montgomerys. Flinnant, Llansaintffraid (Oct 7).

Salop. Chetwynd, Shawbury, Shrewsbury (Oct. 7).

Staffs. The Bungalow, 74 The Crescent, Willenhall (Oct. 5).

Suffolk. Hall Farm, Wattisham, Ipswich; Meadow Dene, Wattisham, Ipswich (Oct. 3).

Warwicks. Glebe Farm, Tanworth-in-Arden, Solihull (Oct. 7).

Yorks. Westfield Farm, Kirk Hammerton (Oct. 7).

Swine Fever

Ches. Bickley Wood Farm, Bickley, Malpas (Oct. 4); Warley Bank Farm, Tattenhall (Oct. 5); Norbury House Farm, Great Warford, Knutsford (Oct. 6).

Devon. 72 Wrafton, Braunton (Oct. 6); Beavor Grange, Axminster (Oct. 7).

Durham. Prospect Farm, High Street, Greatham, West Hartlepool (Oct. 3); Farnley Farm, Hunwick, Crook; Dog and Gun Field, Neasham Road, Darlington (Oct. 7).

Essex. Sturgeons Farm, Writtle, Chelmsford (Oct. 3).

Merioneth. Gesail, Towyn (Oct. 7).

Montgomerys. Glyndwr Farm, Llanfair Caereinion, Welshpool (Oct. 3).

Norfolk. Fengate Farm, Marsham (Oct. 3); The Manor Seething, Norwich (Oct. 7).

Salop. Clee View, Munslow, Craven Arms (Oct. 3); Six Bells, Worthen, Shrewsbury (Oct. 7).

Worcs. New Elms Farm, Stoke Prior, Bromsgrove (Oct. 3).

Yorks. Brook House Farm, Wroot, Doncaster (Oct. 4); Park Lane Farm, Dunsville, Doncaster (Oct. 5); Paradise Grange Farm, Ryther (Oct. 7)

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

SCIENTIFIC

Resistance to *Trichostrongylus colubriformis* Produced by X-irradiated Larvae

Sir,—We have extended our observations on immunisation against helminth infections to include Trichostrongylosis of sheep. The experiment reported below, while not giving results which are yet applicable to field conditions, is promising and indicates that further work might lead to a useful vaccine.

A strain of *T. colubriformis* was obtained from Drs. Stewart and Gordon, of the McMaster Institute, Sydney, who also kindly gave advice on artificial infections.

Five lambs, controls on the infectivity of the larvae used to make the vaccine, were each given 10,000 normal infective larvae of *T. colubriformis*. Their faecal egg counts rose to 2,200 per g. and when they were killed one month later, the mean intestinal worm burden was 5,950.

Each of 15 lambs was given 10,000 larvae irradiated with 40,000 roentgens on a Newton Victor GX 10 machine at a rate of 186 r. per min. Their egg counts rose to 420 per g. and 5 killed one month later had a mean worm burden of 3,900. The remaining 10 were re-vaccinated and challenged 6 months later with 10,000 normal larvae. They were killed one month after this and the group mean worm burden was 34. A control group of 5 lambs of the same age and challenged at the same time, had a mean worm burden of 1,100.

Another group of 10 lambs was treated similarly using a vaccine containing only 5,000 larvae. These gave a mean post-vaccination egg output of 250 per g. and a mean of 3,000 worms developed from the vaccine. On challenge with 10,000 normal larvae the mean worm burden was 25.

This experiment shows that irradiated larvae can give rise to an immune response capable of giving a good protection. In the present case the X-ray dosage was too low and worms developed to the adult stage although they were largely non-egg laying females.

Further experiments, to be reported later, have shown that it is possible to inactivate *T. colubriformis* by X-rays.

Yours faithfully,
W. F. H. JARRETT.
F. W. JENNINGS.
W. I. M. McINTYRE.
N. C. C. SHARP.
University of Glasgow Veterinary School,
Veterinary Hospital, Bearsden Rd.,
Bearsden, Glasgow. *October 7th*, 1960.

GENERAL

Trichinella in the British Isles

Sir,—As a specialist in the ways of parasitic worms I feel it to be my duty to sound a note of warning against a complacent acceptance of the presence of trichinosis in our country, such as is signified by the "Comment" that appeared on page 829 of THE VETERINARY RECORD for October 1st, 1960. In actuality, the position is far from satisfactory. Infected communities of rats form the endemic centres from which it spreads, and although the use of Warfarin has reduced the numbers of these animals there has been no essential change in the general position since 1941, and a repetition of the Wolverhampton outbreak of over 400 clinical cases of trichinosis in man might occur again to-morrow. At any time, an infected rat might be eaten by a pig, and the carcase of that pig proceed to the comminuters and mechanical mixers, leading to a rapid and efficient distribution of thousands of infective larvae in the sausages that are produced.

The note in THE VETERINARY RECORD to which I have referred states:

"A negative result is often more valuable than a positive one." In my opinion, however, it would be difficult to find one of less value than the negative result of an examination of pigs' carcases for *Trichinella*. Over 4,000 carcases were examined after the Wolverhampton outbreak without finding any evidence of infection; between 1,000 and 2,000 were examined following the 1959 outbreak in the vicinity of Bideford, and large numbers have been examined at other times—both home produced and imported—but almost invariably with the same negative results. Of what significance are these results, however, compared with the positive evidence provided by the occurrence of an outbreak, both for the presence of the parasite and for its ability to get through from rats to man?

The following outbreaks have been reported since the one which occurred in Wolverhampton during the war:

In south-east London in 1941; in Penrith in 1941; in Lewisham in 1941 (3 cases); in Hertfordshire, also in 1941 (5 cases and several others suspected); in Northern Ireland in 1945 (705 cases); in Barry, South Wales in 1952 (25 cases); in Liverpool in 1953 (82 cases); in Limerick in 1956 (7 cases) and in Bideford in 1959 (10 cases).

The examination of rats has revealed a high incidence in some areas; in south-east London 25 per cent. of the rats examined; in the Penrith town refuse dump 9 per cent. of 116 rats; at the Wolverhampton sewage works 2 of the 13 rats examined. Investigations carried out in connexion with the Barry and the Limerick outbreaks also revealed the presence of infection in rat communities. Wherever a source of infection has been traced in this way it has invariably suggested our own home produced pigs as responsible for the transmission to man. If one adds to this list the finding of *Trichinella* in a fox at Truro it must be concluded that there is ample evidence for the widespread occurrence of the parasite in our country. But there is yet more evidence to be added; some hundreds of human diaphragms have now been examined, showing an incidence of over 10 per cent. infection with the parasite. Although we may be glad to know that this is a little lower than the incidence in the United States, our reactions at the end of such an account of outbreaks and occurrences can hardly be those of self-congratulation.

Yours faithfully,
E. L. TAYLOR.

Central Veterinary Laboratory,
Ministry of Agriculture, Fisheries & Food,
New Haw, Weybridge,
Surrey.

October 6th, 1960.

Pig A.I.

Sir,—I would like to announce through the medium of your columns an exciting improvement in the fertility level obtained with the artificial insemination of pigs in the area serviced by the Hampshire Cattle Breeders' Society.

The field project started in 1955, and in the following 4 years 24 inseminators were involved in the insemination of 3,675 pigs, only 40 per cent. of which farrowed after a single insemination. These men had performed this work in addition to their routine cattle insemination, whilst already averaging about 20 farm visits per man per day. During 1958, an attempt was made to restrict pig inseminations to 4 main operators in order to consolidate the available experience among as few men as possible. Day-to-day exigencies, however, prevented them from performing more than half the inseminations. As a result, indoctrination of the pig farmer concerning the optimal requirements only transpired in a haphazard way and critical assessment of the sexual state of the animal was severely impaired.

In my report to the Colloquium of Reproduction and A.I. of the Pig, held in France last year (Madden, 1959) my data revealed that a highly significant raising of the farrowing rate was obtained where the female pigs stood firmly to be mounted at the time of insemination. It became clear that if pigs solely in this sexually receptive state were inseminated, then much higher fertility levels would be achieved than those hitherto experienced.

In August, 1959, a deliberate policy to reject all females which would not stand to be mounted, was inaugurated. In the first instance, one particular inseminator, working only with pigs, carried out this programme of rigid exclusion. Of his first 115 inseminations, 72 per cent. farrowed. Subsequently, 80 per cent. of 188 pigs inseminated by him in 1960 have farrowed down, giving an overall average of 77 per cent. on the 303 pigs he inseminated.

In March, 1960, it was made possible, through a subsidy from P.I.D.A., to release yet another man for pig work alone. After only 2 weeks tuition, he carried out the insemination of 102 pigs, 68 per cent. of which have farrowed. On the last 60 of these he achieved a rate of 75 per cent.

Fertility levels of this order have been attained on small numbers of pigs in various research projects. Aamdal and Hogset, 1957; Du Mesnil and Dauzier, 1956; Gotink, 1959; Gregersen, 1958, 1959; Hancock, 1959; Hess, Ludwick and Teague, 1959; Ito, Niwa Judo and Mizuho, 1948; Kvasnitsky, 1958; Melrose, 1960; Niwa, 1958; Polge, 1956; Radford, 1959; Riddell-Swan, 1960; where responsible persons, seeking to prove the technical feasibility of A.I. in swine, selected females for breeding by that method. Frequently the use of a vasectomised boar was invoked to detect those in oestrus. It was a common-sense and rather obvious criterion in those trials, that the female should be capable of allowing coitus by the boar. In translating the research work into the field, it would appear that this optimum stage has been neglected—with disastrous effects on fertility and the progress of commercial pig A.I. schemes.

With regard to the manner in which exclusion of the females in a sub-optimal state actually raises fertility, first and foremost, in applying the mounting test, rejection occurs of all females which are simply not in oestrus at all. My own data support that of the French workers, who, testing field pigs offered for insemination, with a boar, found 26 per cent. to be unmountable (Du Mesnil and Dauzier, 1959).

Equally established in my own experience, however, is the fact that a small proportion of females may be in oestrus and yet not submit to the mounting technique by a technician. Others, with overt signs of oestrus will refuse to be mounted by a boar. The problem remains to discover whether a mechanism exists which enhances the fertility of those females which stand properly, to a level well above that which may be obtained by the artificial "rape" of pigs that do not behave in this sexually receptive manner. Recent and as yet unconfirmed data I have to hand, tend to suggest that an orgasm is induced far less frequently in females that do not stand to be mounted and that the lack of this "boost" to the transport of the semen may be the cause of the lowered fertility.

The farrowing rate experienced after one natural service appears to be in the region of 86 per cent. (Bond, 1960; Braude, 1959; Madden, 1959). Of the last 120 pigs, selected by optimal behaviour at the time of insemination, and inseminated by the specialist pig inseminators at this centre, 83 per cent. of those which have had time to farrow have done so. Whilst the number of animals involved is still small, the lift in fertility achieved is very highly significant and apparently approximates that resulting from natural service.

In the first 6 weeks of the intensive rejection campaign, 46 per cent. of 204 pigs offered for service were excluded. Subsequently, only 26 per cent. of 626 have had to be rejected—a dramatic demonstration of the rapidity with which the user of the service will adhere to the A.I. centre's requirements when these are enforced in a sufficiently obstinate manner. Overall 26 per cent. of sows have been rejected and 40 per cent. of the gilts. A small proportion of these gilts were rejected because they were considered immature.

This method of selection of the animals suitable for insemination has resulted in an overall drop of only 14 per cent. in the number of inseminations actually performed when this is compared with the corresponding period in 1959. In actual fact there has been an increase in demand for service of 29 per cent. this year. The selection method described provides for high fertility so there should now be very little hindrance towards the establishment of the widespread use of pig A.I. and the enjoyment of the manifold associated benefits for the pig industry of this country.

Period	Operator	Number of inseminations	Farrowed per cent.	Method
1955–Aug., 1959	24 men	3,675	40	All pigs
Aug.–Dec., 1959	"A" only	115	72	Exclusion of unmountable pigs
Jan.–Apr., 1960	"A"+ "B"	170	69	
Apr.–May, 1960	"A"+ "B"	120	83	

I wish to express my thanks to Mr. S. H. Williams whose technical skill and perseverance made this advance in the development of commercial pig A.I. possible. Progress has been also helped considerably by the financial generosity of P.I.D.A.

Yours faithfully,
D. H. L. MADDEN,
Veterinary Officer.

Artificial Insemination Centre,
Lyndhurst, Hants.
October 5th, 1960.

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